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R. C. O. MATTHEWS

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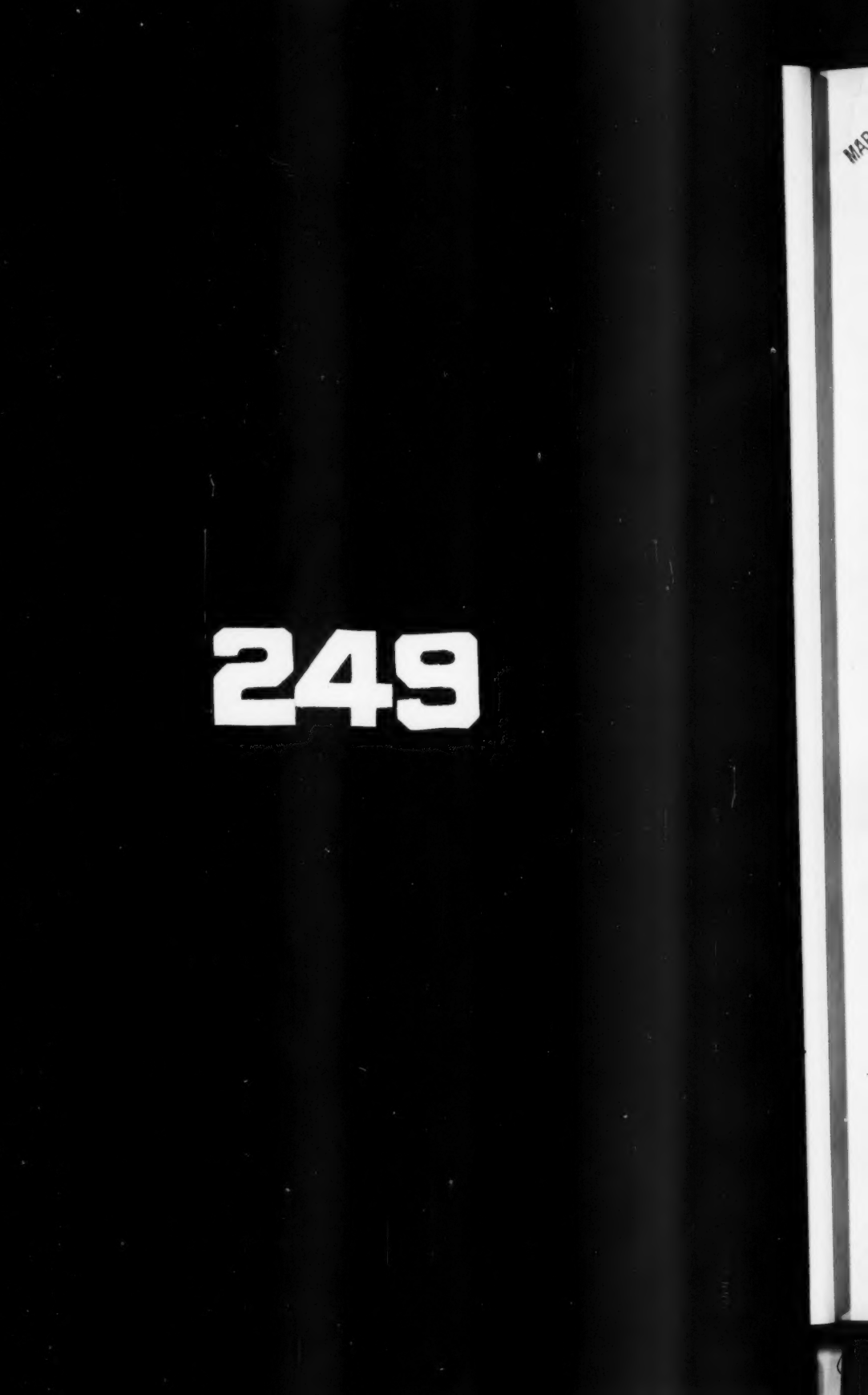
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THE ECONOMIC JOURNAL

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DEPRECIATION, REPLACEMENT AND GROWTH[1]

DEPRECIATION allowances in the United States have usually provided over one-half of expenditures on gross investment. The magnitude of this fraction has worried employment-minded economists like Keynes and others, and was prominently discussed in the TNEC hearings and reports.[2] The other aspect of capital depreciation—that a large part of current investment is apparently needed (and not only in the United States) just to keep the capital stock intact becomes important there in war-time, and it is always important to those countries who do not look at investment primarily as an employment-creating device and who suffer from a shortage of savings. In Britain, depreciation charges relative to gross investment have been somewhat larger than in the United States, while the Russians have managed to get away with a mere fraction of either—disparities which cannot be completely explained by differences in national temperament or by manipulations of Soviet statisticians.[3]

Much as I hate to spoil my story by announcing its plot in advance, this paper is too long and involved to be clear otherwise. It deals with growth of investment and of a capital stock subject to depreciation and periodic replacement. Our first task is to inquire into the relationship between annual depreciation charges and investment in a growing economy or a firm (Section I). Next, the relation between replacement on the one hand and investment and depreciation on the other is derived (Section II). It turns out

[1] I am very grateful to the RAND Corporation, and particularly to Joseph A. Kershaw and Norman M. Kaplan, for assistance in the preparation of this paper. A preliminary draft was presented to RAND in August 1951, and the final version in September 1952 (P-325). Thanks are also due to Edith T. Penrose for her excellent editorial assistance and to Robert I. Berg (both of the Johns Hopkins University) for his faithful help with computations.

[2] J. M. Keynes, *The General Theory of Employment, Interest and Money* (London, 1936), pp. 98–106; Alvin H. Hansen, *Fiscal Policy and Business Cycles* (New York, 1941), pp. 384–8; United States Temporary National Economic Committee, *Investigation of Concentration of Economic Power* (Seventy-sixth Congress, Washington, 1940–41): *Hearings*, Part 9; *Final Report of the Executive Secretary*; *Monographs Nos.* 15 *and* 37.

[3] For data and sources, see pp. 5–6, including footnotes.

that in a growing society, replacement falls far short of depreciation. Hence, investment net of depreciation cannot be identified with investment net of replacement. This suggests that existing growth models which have taken this identity for granted should be revised, and two such attempts are presented (Sections III and IV). In addition to the propensity to save and the capital coefficient (or its reciprocal) familiar to us from their past performances, a major role is played here by the life span of capital, previously neglected.

The paper is essentially an attempt to put into reasonable English the results of mathematical derivations. Its mathematical skeleton will, as usual, be hidden in an Appendix and notes; final results and numerical illustrations are given in the text, but a few sharp bones which I have not been able to conceal still protrude here and there.[1] The following assumptions are made:

1. Each capital asset has a definite life span, indicated by m (years) and is religiously retired upon the expiration of this period.

2. In accordance with prevailing American business practice, depreciation, D, is computed according to the straight-line method applied to the *original* cost of each asset. There being no scrap value, the annual depreciation rate is $1/m$.

3. The discussion proceeds as if every asset had the same life span of m years. Actually, m should be interpreted as the *average* life span of all assets, the Appendix indicating the proper averaging procedure.[2]

4. Gross investment, G, growing at a relative annual rate of r is the propelling force of the system. This rate is expressed in current prices, and will be deflated when required. The constancy of r greatly simplifies the mathematics, but not without cost. Unless qualified, "investment" is gross both of depreciation and of replacement.[3]

5. The existence of government is not explicitly recognised.

[1] All our formulae and numerical illustrations are based on the so-called continuous functions from calculus, where investment, depreciation and other processes take place continuously through time rather than once each period. In the text these functions are expressed in the more familiar compound-interest formulas available in any college algebra. The error involved is small enough to be disregarded.

[2] This is subject to certain qualifications to be indicated below.

[3] Throughout the paper, r is assumed to be positive or zero. Since inventories are not subject to depreciation, it may be just as well to exclude them from G, though the error would not be large in any case. An attempt to assign the principal role to net rather than to gross investment did not pay for the ensuing complications.

6. To make our results applicable to a new firm as well, a zero stock of capital in the initial period is assumed in Section I. This, of course, is not true of an established firm or of the economy as a whole; even the least-developed countries possess capital stocks surprisingly large relative to their outputs. In any case, the effects of this assumption do not last long.

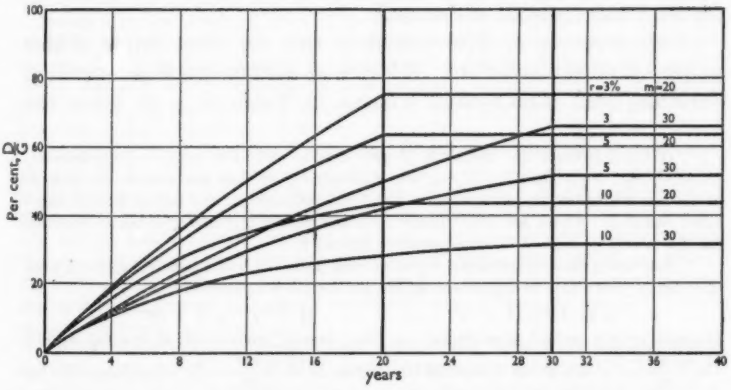
While these assumptions simplify our task, they do, of course, restrict the usefulness of the results. A smooth and steady growth of investment is not found in a capitalist economy; a model embodying fluctuations of some form superimposed on a growth curve would be more appropriate there. Also, the treatment of the life span of assets as a given constant completely ignores the problem of replacement timing: surely assets are not retired in such an automatic fashion. There will be room for other complaints; but there is just so much one can do in one paper at one time.

I

Like most economic problems, the present one is concerned with ratios: in Section II we will deal with ratios of replacement to

CHART I

The Magnitudes of D/G *for Different Values of* r *and* m



investment and to depreciation; here we are concerned with the ratio of depreciation to investment, D/G. There being no capital at the start, D/G begins at zero and rises gradually to its *final* value, which, as shown on Chart I, it reaches at the expiration of m years: since assets last for m years, capital stock existing at any moment of time is the accumulation of investments over the preceding m years; the absence of investment before the zero year

prevents the establishment of the final relationship between D and G until m years have expired.[1]

The final value of D/G is given by the expression,

$$D/G = \frac{1 - \frac{1}{(1+r)^m}}{rm} \tag{1}$$

which varies inversely with both m and r.[2] The role of m is obvious: longer-lived capital reduces depreciation charges; but what r is doing here is not so clear. The more rapid the growth of investment (the higher the r), the greater is its present magnitude relative to investments of past years and hence to the existing stock of capital, the latter, as pointed out above, consisting of the accumulation of investments over the preceding m years. D, being a fraction of the capital stock, a high r reduces D/G.

It is most interesting that D/G is not only a function of r and m, but also of their product, rm, so that r and m are symmetrical in the multiplicative sense. A continuous function formula of D/G makes this obvious, but a glance at a compound-interest table will convince the reader that, within a reasonable range, this is also true for expression (1): a dollar invested at 1% for thirty years compounds to approximately the same amount (1·3478) as a dollar invested at 2% for fifteen years (1·3459), one invested at 3% for ten years (1·3439) and so on.[3]

This property of D/G—which is true for most ratios of this paper—is most convenient; it leaves us with only one independent variable—rm. The second column in Table I (p. 8) gives the

[1] If total investment consists of two kinds, with life spans of m_1 and m_2 respectively, such that $m_2 > m_1$, the correctness of this statement, as well as of all our formulas, requires that at least m_2 years from the initial period must have elapsed. There are other conditions restricting the use of m as an average for the whole economy. See Appendix, Model 2.

[2] Assuming that investment equalled one dollar m years ago, its growth over the last m years can be expressed as the geometric progression:

$$1, (1+r), (1+r)^2, \ldots \quad \ldots (1+r)^{m-2}, (1+r)^{m-1}$$

Its sum over a period of m years, *i.e.*, the present gross stock of capital, equals $\frac{(1+r)^m - 1}{r}$. D, being $1/m$th of the latter, is $\frac{(1+r)^m - 1}{rm}$. Dividing this by $G = (1+r)^m$, we get the expression in the text.

If t indicates the length of time which passed from the initial period, and $t < m$,

$$D/G = \frac{1 - \frac{1}{(1+r)^t}}{rm}$$

[3] The final value of D/G in continuous form is $\frac{1 - e^{-rm}}{rm}$. With continuous compounding, the result of the example in the text would amount to $e^{0.3} = 1.3499$.

magnitudes of D/G for various values of rm, and the reader can choose his own combinations of the particular values of r and m.

A reasonable approximation would place the average United States m at 30 years or so,[1] and the average real r over the last 80 years at, or slightly above, 3%.[2] With rm thus being in the vicinity of 1, D/G in constant prices would approximate to 60%. In current prices, r comes closer to 5%; this sets the rm at 1·5 and D/G around 50%. Barring unforeseen changes, a 60–65% average D/G in constant prices may be taken as a reasonable approximation for the United States for some time to come.[3]

[1] Solomon Fabricant, *Capital Consumption and Adjustment* (National Bureau of Economic Research, New York, 1938), p. 34. Estimates obtained orally from the United States Department of Commerce also place the average American m in the vicinity of 30 years. It is possible that it has been declining over time, because of the increasing importance of equipment as compared with construction. For our purposes a rough approximation is quite satisfactory.

[2] From Simon Kuznets, *National Product since 1869* (National Bureau of Economic Research, New York, 1946), pp. 50, 115; *Survey of Current Business Supplement, National Income and Product of the United States, 1929–50* (Washington, 1951), pp. 146, 150. The rate of growth has, of course, sharply fluctuated from period to period.

[3] A comparison of these magnitudes with statistical data depends on the method of estimate and period chosen. According to George Terborgh, during the sixty years, 1869–1929, the American D/G in real terms ranged between 50 and 70%, with an upward trend due to the slight fall in the rate of growth of G. The average for the latter half of the twenties was 64% (*The Bogey of Economic Maturity* (Chicago, 1945), p. 123). His investment, however, includes consumer durables as well; otherwise, D/G would be somewhat lower. From Kuznets (*op. cit.*, p. 81), we find that over the period 1869–1908, the American D/G in real terms was only 45%, evidently because of both a higher r and the relative predominance of construction over equipment, the former having a larger m. In 1909–28, D/G averaged over 60%.

In current prices, Kuznets' D/G figures for 1869–1928 are practically the same as in real terms. This is rather surprising, because G in current prices grew much faster than in constant prices. More recently, D/G in the United States in current prices was as follows: in 1929, 53%; 1929–41, 86·4%; and since the war (1946–51), 42·2%, the last figure reflecting not only a high level of investment after the war, but also the valuation of a good part of capital stock in pre-war prices. All these are the ratios of depreciation charges to the sum of new construction and producers' durable equipment (*Survey of Current Business, loc. cit.*, p. 151, and the February 1952 issue, p. 9).

As far as the financing of investment is concerned, these ratios are overstated for two reasons: first, not all business depreciation charges are actually earned, particularly during depressions. Second, non-business investment (such as owner-occupied housing) is not subject to formal depreciation accounting, though regular mortgage payments give rise to savings considerably in excess of normal depreciation charges.

The British D/G seems to be slightly above the American, presumably owing to a lower rate of growth. In current prices the 1924 figure stood at 59% (as compared with some 55% for the United States); in 1929, at 61%. Between 1930 and 1934 it fluctuated between 62 and 69%. Since the war it has been around 50% (somewhat higher if public investment is excluded). These figures should be treated as rough indications: my knowledge of British statistics is

Interesting data on Soviet investment is presented in Norman Kaplan's recent study.[1] Over the period 1930–50, the Soviet D/G in current prices averaged between 12 and 25%, a range that is not too meaningful because of sharp inflations. As an estimate of the real rate of growth of Soviet investment, Kaplan suggests 12%; this sounds rather high, but the correct magnitude (if there is such a thing) must be extremely hard to ascertain.[2] The relative shares of equipment and construction in Soviet investment being similar to the American, an m of 30 years may be taken for a start; perhaps it should be lowered to take account of poorer quality and lack of care of their capital; but then obsolescence may play a smaller role in Russia than in the United States, because it should pay there to use a new machine with, rather than instead of, an old one. Lacking knowledge about the relative magnitudes of these adjustments, we may just as well retain the above estimate for m. The Soviet rm in real terms would reach, then, the very high magnitude of 3·5 or so, with the corresponding D/G of 28%. Even an 8% rate of growth (which seems quite conservative) would put this ratio below 40%. Thus, in net (of depreciation) investment, the Soviet advantage over the United States and Britain must be much greater than in gross.[3]

The application of these ideas to a firm involves a very heroic simplification; yet the results may be of some interest. As shown on Chart I, in the first few years of a firm's existence a very small part of investment expenditures comes from depreciation allowances; as time goes on depreciation as a source of funds plays an increasing role, provided, of course, that the firm is able to earn it.

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very slight. See Colin Clark, *National Income and Outlay* (London, 1937), pp. 86, 185; *National Income and Expenditure of the United Kingdom, 1946 to 1950*, Command Paper 8203 (London, 1951), pp. 13, 43, 51; *Statistics of National Income and Expenditure*, Statistical Papers, Series H, No. 1, prepared by the Statistical Office of the United Nations (New York, 1952), p. 46.

[1] Norman M. Kaplan, *Soviet Capital Formation and Industrialization*, a RAND Corporation Study P-277 (Santa Monica, California, March 6, 1952), particularly pp. 1–12.

[2] This is due not only to the peculiarities of Soviet statistics, but even more to the fact that under rapidly changing technological conditions, assortments of goods and prices a dependable index of output is extremely difficult to construct. On this see Alexander Gerschenkron, *A Dollar Index of Soviet Machinery Output, 1927–28 to 1937*, a RAND Corporation Study R-197 (April 6, 1951).

We should be somewhat careful in applying our formulas to the Soviet experience, because the assumption that at least m years have passed from the initial point (and their strict interpretation would require even a longer period) hardly fits the Soviet case.

[3] According to Kaplan, the fractions of gross national product devoted to gross investment in Russia and in the United States (excluding the depression years in the latter) have been quite similar, between 15 and 20%.

Finally, after the first m years are over, D/G becomes constant, unless sharp changes in r and m take place. With stable prices, an average American firm should eventually be able to finance nearly two-thirds of its fixed capital requirements from depreciation; inflations such as have happened in the past would bring this ratio down to one-half or so.

II

We now turn to replacement (R). Since its magnitude is affected by price changes, two separate cases will be considered.

Case 1. Constant Prices

By assumption, replacement takes place exactly m years after an asset was produced, and therefore, $R = G$ made m years earlier. Let the latter equal 1. If G has remained constant, the present stock of capital, being the accumulation of investment over the past m years is simply m. Since by definition D is $1/m$th of the capital stock, $D = 1$. Hence (after the expiration of the first m years) R and D are identical.

Growth destroys this identity. If G was at 1 m years ago, as in the preceding example, and has grown at the rate of r per year since, the present stock of capital is larger than m, and D exceeds 1. Therefore, D exceeds R.

As this excess of D over R is caused by the growth of G over the period of m years, the disparity between D and R will be greater the larger r and m are. Hence the ratio R/D varies inversely with r and m. As a matter of fact, like D/G of the preceding section, it varies inversely with their product rm.

More exactly, a stream of investment which stood at one dollar m years ago now equals $(1 + r)^m$. Hence by definition of R given above,

$$R/G = \frac{1}{(1 + r)^m} \tag{2}$$

which does not equal D/G as given by (1). Dividing (2) by (1), we find

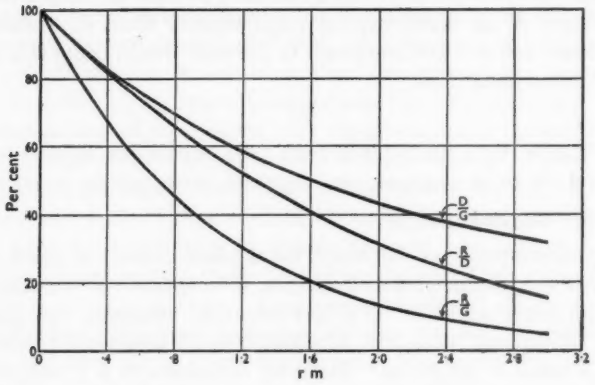
$$R/D = \frac{rm}{(1 + r)^m - 1}{}^{1} \tag{3}$$

Chart II and Table I show the final magnitudes of D/G, R/G and R/D as functions of rm. Under stationary conditions they all equal 100%. As rm increases, they decline, the fall in R/G being the most pronounced. Taking the United States rm (in constant

[1] The corresponding continuous function formulas are: $R/G = e^{-rm}$; $R/D = \frac{rm}{e^{rm} - 1}$.

CHART II

The Final Magnitudes of D/G, R/G *and* R/D



prices) around 1, as before, we find that while D constitutes some 63% of G, only 37% of the latter is needed for replacement. Thus R/D equals only 58% (37/63), the remaining 42% of D being available for expansion.

TABLE I

The Final Magnitudes of D/G, R/G *and* R/D *as Functions of* rm

rm.	Percentages.		
	D/G.	*R/G.*	*R/D.*
0·1	95	91	95
0·2	91	82	90
0·3	86	74	86
0·4	82	67	81
0·5	79	61	77
1·0	63	37	58
1·5	52	22	43
2·0	43	14	31
2·5	37	8	22
3·0	32	5	16
3·5	28	3	11

The Soviet picture is even more striking. Should their real *rm* be as high as 3·5, only 11% of their depreciation charges (as defined here) would be needed for replacement, while replacement would constitute a mere 3% of investment. Even an *rm* of 2·5 would keep their R/G down to 8%, a figure small enough to be frequently disregarded. Again, their advantage over the United States and Britain in investment net of replacement is much

greater than a comparison of gross investment figures would indicate.

Case 2. Changing Prices

A change in prices distorts these relationships, because the cost of R no longer equals that of G made m years earlier. Retaining r as the rate of growth of investment in current prices, we shall indicate the real rate of growth by u, and the rate of increase of prices by $i = r - u$.

Depreciation being related to the capital stock in original prices, D/G still varies inversely with r, and is entirely unaffected by the magnitude of the real rate of growth u. Whether investment grows rapidly because of real factors or merely as a result of inflation is immaterial for D/G.

The stream of investment which started from one dollar m years ago again equals $(1 + r)^m$ at present, but owing to the rise in prices at the rate of i per year, its present cost of replacement has increased to $(1 + i)^m$. Hence

$$R/G = \frac{(1 + i)^m}{(1 + r)^m} \tag{4}$$

which, with a minor error, can be expressed as

$$R/G = \frac{1}{(1 + u)^m} \tag{5}$$

Dividing (4) by (1), we obtain the formidable

$$R/D = \frac{rm(1 + i)^m}{(1 + r)^m - 1} = \frac{m(u + i)(1 + i)^m}{[1 + (u + i)]^m - 1} \tag{6}$$ [1]

It can be demonstrated without too much trouble that R/D varies inversely with u (just as in (3) it did with r), and it is obvious that a rise in prices raises the cost of R and therefore the magnitude of R/D, but the relationship between m and R/D is more complex. First, an increase in m intensifies the effect of price changes on R/D; secondly, it reduces R/D for the same reason as in Case 1. If prices fall, both effects work in the same direction, and R/D falls. If prices rise, they work in opposite directions, and an increase in m may move R/D up or down, depending on the relative magnitudes of the variables involved. (There even exists an m which maximises R/D. This may delight

[1] With continuous functions, $R/G = e^{-um}$, and $R/D = \frac{rme^{im}}{e^{rm} - 1} = \frac{(u + i)m}{e^{um} - e^{-im}}$. The error mentioned in the text arises from the use of discrete functions. Its magnitude can be ascertained by actually performing the operation indicated. It is small enough to be disregarded.

amateur mathematicians, like myself, but has little economic meaning.)

We have already seen that a rise in prices reduces D/G. In other words, a smaller fraction of investment can be financed by depreciation. We now find that it also increases R/D; thus a larger part of depreciation is needed for replacement. Both effects are inflationary and help inflation to feed on itself. Exactly the same phenomenon but in the opposite direction takes place during deflation. Thus the practice of charging depreciation on the basis of original cost of capital brings in a certain element of instability.[1]

This should not be exaggerated, however, because in depression many firms are unable to earn their depreciation charges, while allowances for price rises are made, formally or otherwise, during inflations; yet some effect on dividend and other policies remains, particularly during deflations due to the conservative basis of our accounting (embodied in mottos such as "cost or market—whichever is lower").[2]

Of the many numerical illustrations that might accompany the expressions for R/D as given by (6) (R/G can be read off Table I by substituting um for rm), only one is given here: the annual rate of inflation (the magnitude of i) required to equalise R with D. This is done in Table II.[3] With a small m, i is roughly equal to u, but as m increases, i considerably exceeds u. Taking u for the United States as before, around 3% and m at 30 years, we find that the equality of R and D requires an i of some 4% per

[1] Between 1929 and 1932 depreciation charges in the United States in real terms (deflated by the price index used by the Department of Commerce in computing gross private domestic investment in 1939 prices—see the *Survey of Current Business 1951 National Income Supplement*, p. 146) increased by 16%.

It should be pointed out, however, that the present depreciation practice, by understating profits during depressions and overstating them during inflations, reduces income-tax liabilities in the first instance and increases them in the second, which should have a stabilising effect on the economy. The latter may be more important than the de-stabilising effect discussed in the text. Also, the revaluation of assets to express depreciation charges in current prices is a most formidable task. On this see E. Cary Brown, *Depreciation Adjustments for Price Changes* (Boston, 1952).

The application of our results to a cyclical problem should be done with care, because our formulas are based on the assumption of continuous growth over the preceding m years.

[2] These institutional factors have unfortunately been disregarded in the recent discussions of the so-called Pigou effect. I certainly dread to think of the damage that a prolonged fall in prices would do to a capitalist economy faced with unemployment. See Don Patinkin, "Price Flexibility and Full Employment," *The American Economic Review* (September 1948), pp. 546–64.

[3] It is computed from the formula $im + e^{-im} = e^{um} - um$, obtained from the expression for R/D given in note 1 on p. 9 by taking $R/D = 1$.

year.[1] Over short periods of time, sharper price rises have taken place, but the average since 1869 or so has been about 2% per year.[2] Thus on the whole, R (as given by (6)) has been some 20% below D, and barring very strong inflations (an annual rise of 4% would double the price level every 17 years), a somewhat similar situation can be expected in the future.

TABLE II

The Annual Rate of Inflation which Equalises Replacement and Depreciation for Given m *and* u

m years. \ *u* percentages.	Percentages.				
	1.	2.	3.	4.	5.
10	1·05	2·1	3·3	4·6	6·0
20	1·07	2·3	3·8	5·5	7·5
30	1·11	2·5	4·3	6·6	9·8
40	1·16	2·7	5·0	8·3	13·5

That a change in prices can upset the relationship between R and D is well known. When prices rise, demands for larger depreciation credits for tax purposes are invariably made, the usual straight-line charges based on original costs being allegedly insufficient to finance replacement. Yet in an economy like the American it takes quite a substantial price rise to bring about the apparently desired equality of R and D.[3] But when prices do not change, this equality is usually taken for granted.[4]

[1] With constant prices and $um = rm = 1$, R (as was shown in Case 1) falls short of D by some 40%. This would suggest at first glance that a price increase of some 1% per year for 30 years would be sufficient to equalise R and D, rather than the 4% indicated in the text. The reason for this apparent discrepancy between common sense and mathematics lies in the fact that as prices rise, D also rises, though not to the same extent.

[2] The sources are given in note 2 on p. 5. All these figures are rough approximations. In the last few years, prices have risen by much more than 2% per year. Whether this will be the pattern for the future remains to be seen.

[3] While some rate of growth, such as was indicated in the text, can be taken for the United States as a whole, there are many firms which grow more slowly, or not at all; for them any price rise may make R larger than D. The discussion in the text should not be interpreted as an argument for less liberal depreciation policy for tax purposes.

[4] The references here range all the way from an abstract article by Ragnar Frisch on "The Interrelation between Capital Product and Consumer-Taking," *Journal of Political Economy* (October 1931), pp. 646–54, to such diverse works as the preliminary *Estimates of the Capital Structure of American Industries, 1939*, by the Harvard Economic Project (January 1950), p. 21; the TNEC *Monograph No. 37, op. cit.*, pp. 69–70; Lewis H. Kimmel, *Depreciation Policy and Postwar Expansion* (Brookings Institution, Washington, 1946), pp. 15–16 and so on. Most economists simply ignore the relationship between replacement and depreciation, which in most relevant instances implies the acceptance of their identity.

For this there are several reasons. First, there is our traditional preoccupation with stationary economics, which, of course, excludes growth. Close to this comes the deeply ingrained treatment of economic phenomena not as infinite processes but as final events which begin and end within a given period of time. An analysis of a constant stream of investment or even of a single or several separate investments are familiar examples of these types of approach. The concept of an economy growing indefinitely at some rate or rates has not yet received its deserved place in our tool-box.

But there is also a more fundamental difficulty. The demonstrated inequality between R and D depends on the definitions of these processes adopted here. If, for instance, depreciation is computed not along a straight line, but as an annuity to be invested at an interest rate equal to r so that it will accumulate to the original cost of the asset at the end of m years, the inequality between R and D disappears.[1] Conversely, the concentration of depreciation charges in the first few years of the life of an asset will increase the disparity between D and R.

The nature of replacement is more complex.[2] Even with a fixed life span of a capital asset, its removal from the books at the end of m years is an accounting entry which may or may not have economic significance. If the productive capacity of the asset remained more or less intact to the end, our assumption that replacement takes place in one operation is not far from reality. On the other hand, if its productive capacity declines gradually over time its replacement by other assets (not necessarily within the same firm) is likewise a gradual process, and should the latter happen to move along a straight line, R and D become identical. If its capacity should decline particularly fast in the early years, replacement will exceed depreciation.

Thus the usually assumed identity of R and D, even in a growing economy (with constant prices), is not necessarily wrong, though I suspect that not all who accepted it had gone through this reasoning. Within a reasonable range, it should be looked upon as a more or less extreme case, the opposite extreme being our present approach. As usual, the truth lies somewhere between them.

In the United States, where assets are usually well maintained and retired more in response to technical obsolescence rather than

[1] I owe this observation to James S. Duesenberry.

[2] An excellent discussion of replacement timing is given by George Terborgh in *The Bogey of Economic Maturity* (Chicago, 1945) pp. 102–8.

because of physical deterioration, our treatment of replacement may be a better approximation of reality. In the more traditional countries the opposite may perhaps be true. Paradoxically, this may also be the case in Russia, where shortage of capital may make obsolescence relatively ineffective.

The extreme case presented here has not only made explicit the assumptions of its rival, but has also laid the groundwork for the general case as some average between them. While numerical results will depend on the averaging method chosen, I doubt if the overall behaviour of the variables will differ greatly from ours.[1]

III

So long as depreciation charges and replacement expenditures are assumed (by design or oversight) to be identical, no harm is done by excluding them from gross savings on the one hand and gross investment on the other. This method has been followed in the existing growth models constructed by Harrod, Fellner, myself and others.[2] But as soon as the divergence between D and R, caused both by growth and changing prices, is recognised, a revision of these models becomes necessary.

The attempts presented here follow in their main logical structure the familiar lines of their predecessors, and possess the same fundamental defect of treating all investment as a single homogeneous stream which enlarges the capacity for the production of goods in general. Capital remains the only limiting factor, all

[1] When I first found that R differed from D (spring 1951), I was not aware of the earlier works on the subject. Since then, I have found a reference to it in E. L. Grant and P. T. Norton, *Depreciation* (New York, 1949), pp. 292–5; a note in George O. May's "The Relation of Depreciation Provisions to Replacement," *The Journal of Accountancy* (May 1940), p. 341. It is also mentioned by the Soviet economist A. I. Notkin in *Ocherki Sotsialisticheskogo Vosproizvodstva* (Moscow, 1938), pp. 104–8, where it is traced back to Marx. (I owe this reference to Alexander Ehrlich of the Harvard Russian Research Center.) There must be other instances as well. A colleague of mine, G. H. Evans, and a former student, Robert Eisner, have also been working along these lines. But the most thorough analysis of the relation between R and D for given r and m that I know of was done by Terborgh (*op. cit.*, pp. 108–19) in 1945. I am sure that I had read his book then, and yet I had entirely forgotten about his presentation, perhaps because of the intensely polemic nature of the book which might have concealed his positive contribution. Also, he did not go beyond numerical examples and therefore did not obtain the general relations between the variables and the symmetry between r and m. It is interesting that his replacement was defined as a simple arithmetic mean between our R and D—a simplified general case.

[2] For a bibliography on this mushrooming subject, see William Fellner, "The Capital–Output Ratio in Dynamic Economics," *Money, Trade and Economic Growth in Honor of John Henry Williams* (New York, 1951), p. 106, and my essay on "Economic Growth: an Econometric Approach," *American Economic Review Papers and Proceedings* (May 1952), p. 480.

other resources being available in sufficient quantities. No explicit recognition of the government, and hence of its expenditures and taxes, is made. These limitations make our models ill-suited for practical problems, but owing to the simplicity of their structure they are unexcelled for use in a first examination of a new relationship in the theory of growth. In our case the innovation consists of working with gross rather than net saving, and in the substitution of replacement for depreciation in the computation of net investment.

An increase in capacity in terms of gross national product (P) is assumed to be proportional to net investment so defined (that is, net of replacement), the factor of proportionality, the capital coefficient, being indicated by $v = \frac{G - R}{\Delta P}$.[1] This implies that assets retain their full productive capacity until their retirement at the end of m years. By contrast, the old growth models work with output, saving and investment net of depreciation and define their capital coefficient as $\frac{G - D}{\Delta(P - D)}$, so that productive capacity of an asset is always proportional to its net-of-depreciation value. Each approach has its own virtues, but since the other has been explored in considerable detail, it may be interesting to find where our new trail will lead. And in following it, we will be able to assign a new and important role to m, and to present a few other novelties as well.[2]

Dealing with an economy rather than with a firm, we can dispense here with the initial m years when no replacement is required. This is not a great loss, but to make use of the results of the first two sections, it is necessary to assume that the rate of growth r (or u) has been maintained for at least m preceding years —a rather uncomfortable position from which to study rapid industrialisation of undeveloped countries; moreover, r (with constant prices, otherwise—u) acquires a new meaning: up to now it has simply been the rate of growth of investment; now it also becomes that rate of growth (of investment and of national product) which is made possible by (or imperative for) the full

[1] A reader familiar with some of my earlier writings (particularly those in *Econometrica* of April 1946, and in the *American Economic Review* of March 1947) may ponder about the difference between the concepts of s and σ used there and this new v. v is the gross capital coefficient, while s is the reciprocal of the net. σ is adjusted for the possible reduction in the productive capacity of other parts of the economy as a result of a given investment programme.

[2] The models presented here are by no means the only ones that can be constructed on the basis of the difference between D and R.

utilisation of the stock of capital. In other words, the actual and potential rates of growth are assumed to be identical, which is not too realistic for a capitalist economy. Both of these assumptions could be dropped, but not without mathematical complications.

As in other models, the rate of growth is expressed in terms of the capital coefficient and the propensity to save. The former has already been defined; for the latter there are several possibilities. The simplest definition of the propensity to save is to express it as a given fraction—β—of the gross national product, without any special provision being made for depreciation (or replacement). Our first model will be so constructed, and its simplicity is gratifying, but it is more applicable to a centrally directed economy, where a part of total output is set aside for investment, rather than to a society like the United States. For the latter, a second model will be presented in which total savings consist of two components: net savings of individuals and corporations, plus depreciation charges. For depreciation, we have the formulas of Section I, while net savings will be expressed as a fraction—α—of the net national product $(P - D)$.[1]

Our task is as follows: express the rate of growth of gross product and of investment in terms of m, v and β or α. Since $\beta = G/P$ is assumed to be constant (and a constant α yields a constant β), the relative rates of growth of P and G are the same.

The β Model

Case 1. Constant Prices (v *and* m *Mutually Independent*).

By definition of v, $\Delta P = \dfrac{G - R}{v}$. Divide both sides by P and substitute $P = G/\beta$ into the right-hand side:

$$(7) \qquad \frac{\Delta P}{P} = \frac{G - R}{vP} = \frac{\beta}{v}\left(\frac{G - R}{G}\right) = \frac{\beta}{v}\left(1 - \frac{R}{G}\right)$$

From expression (2), Section II, $\dfrac{R}{G} = \dfrac{1}{(1 + r)^m}$.

[1] Two implicit assumptions should be pointed out: first, there is no gestation period of capital assets; second, both (the net and the gross) propensities to save exclude that part of saving which goes into inventory accumulation because our investment is limited to fixed capital. This, however, is a minor item.

There are other ways of defining the propensity to save. For instance, it could be made a function of the rate of growth of income, as suggested by J. S. Duesenberry in his *Income, Saving and the Theory of Consumer Behavior* (Cambridge, 1949). This would not involve circular reasoning, but merely give us a system of simultaneous equations.

Substituting this into (7) and observing that the left-hand side equals the relative rate of growth of P, that is, r, we finally get

$$r = \frac{\beta}{v}\left[1 - \frac{1}{(1+r)^m}\right] \tag{8}$$

This is one of our simpler expressions, yet it cannot (to my knowledge) be solved explicitly for r. Taking advantage of the fact that the right-hand side of (8) is a function of rm, numerical solutions can be easily obtained for given ratios of $\frac{\beta}{v}$ by setting up a rm column, computing the values of r and then dividing them into the corresponding values of rm to find the magnitudes of m. Such a calculation is presented in Table III.

TABLE III

The Relationship Between m *and* r *for Given* $\frac{\beta}{v}$

rm.	$\frac{\beta}{v} = 5\%$.		$\frac{\beta}{v} = 7{\cdot}5\%$.		$\frac{\beta}{v} = 10\%$.	
	$r\%$.	m years.	$r\%$.	m years.	$r\%$.	m years.
0·1	0·5	21·0	0·7	14·0	1·0	10·5
0·2	1·0	22·1	1·4	14·7	1·8	11·0
0·3	1·3	23·1	1·9	15·4	2·6	11·6
0·4	1·6	24·3	2·5	16·2	3·3	12·1
0·5	2·0	25·4	3·0	16·9	3·9	12·7
0·6	2·3	26·6	3·4	17·7	4·5	13·3
0·7	2·5	27·8	3·8	18·5	5·0	13·9
0·8	2·8	29·1	4·1	19·4	5·5	14·5
0·9	3·0	30·3	4·5	20·2	5·9	15·2
1·0	3·2	31·6	4·7	21·1	6·3	15·8
1·5	3·9	38·6	5·8	25·7	7·8	19·3
2·0	4·3	46·3	6·5	30·8	8·6	23·1
2·5	4·6	54·5	6·9	36·3	9·2	27·2
3·0	4·8	63·1	7·1	42·1	9·5	31·6
3·5	4·8	72·2	7·3	48·1	9·7	36·1
Lim $m \to \infty$	5·0		7·5		10·0	

Its striking characteristic is the extreme sensitivity of r to m. A $\frac{\beta}{v}$ of 5% (with $\beta = 15\%$, for instance, and $v = 3$) is not at all uncommon; the American figure is not much higher, and it is certainly lower in most non-communist undeveloped countries, yet an m of 20 years results in a microscopic growth of less than $\frac{1}{2}$ of 1%; an r of 2% is not reached until m exceeds 25 years. As rapid deterioration of industrial equipment due to improper care is quite common in these countries, even a β of 20% may not give

them any significant growth, unless a more intensive utilisation of capital (that is, a reduction in v) can be achieved. The fact that the absence of replacement in the first few years (of an industrialisation programme) will conceal the true state of affairs makes the latter particularly dangerous.

The last case of Table III, where $\frac{\beta}{v}$ equals 10%, was constructed with Russia in mind. If we should take Kaplan's estimate of the Soviet β in the vicinity of 18% (excluding inventories), which appears surprisingly low, and an m of 30 years, a 10% rate of growth is possible, provided their v is below 2.[1] A rate of growth of 12% suggested by Kaplan would require v to drop to approximately 1·5. Compared with American coefficients, this would either indicate a much more intensive utilisation of capital, or the improbability of such rapid growth.[2]

Case 2. Constant Prices (v *a Function of* m)

The conclusion of Case 1 that larger m is always conducive to growth suggests that the best path to economic development lies in the building of pyramids. So it would be (in the framework of this model) if a larger m were not accompanied by a higher v, that is, if longer-lived capital were not more expensive relative to output. There is no doubt that beyond a certain range greater capital longevity becomes very expensive (in terms of v) and even completely useless due to obsolescence. It is quite reasonable to assume then that v should vary directly with m, at least over

[1] When rm is large, R/G as given in Table III is so small that r almost equals β/v.

[2] Kaplan, *op. cit.*

In the United States the overall capital coefficient defined as the ratio of gross fixed capital (without inventories) to gross national product (both in constant prices) has been around 3, evidently with a downward trend (it was near 4 in 1900). During the last war it went down to something like 2·5 (including military assets), and has apparently stayed around this figure since. So a Soviet capital coefficient of 2 does not appear impossible. It should be made clear, of course, that these are extremely rough estimates and that we should not accept or reject a certain rate of growth for Russia *merely* because it does or does not imply a " reasonable " capital coefficient.

For sources, see the following studies of the National Bureau of Economic Research: R. W. Goldsmith, " A Perpetual Inventory of National Wealth," Conference on Research in Income and Wealth, *Studies in Income and Wealth*, vol. 14 (1951), pp. 18–19; J. E. Reeve *et al*, " Government Component in the National Wealth," same publication, vol. 12 (1950), p. 502; Simon Kuznets, *Annual Estimates of National Product 1869–1949* (mimeographed), Capital Requirements Study (March 1951).

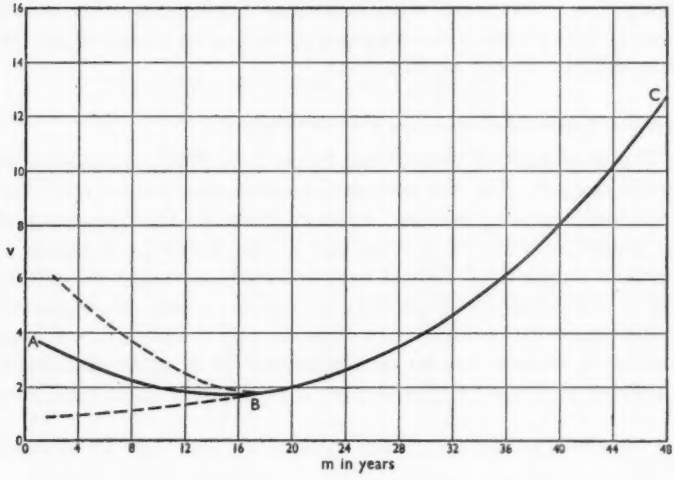
Goldsmith's net of depreciation estimates were divided by 0·6 to obtain the corresponding gross magnitudes.

a certain range, but the exact form of the function is not easy to ascertain.

An attempt to derive a regression of v on m from Leontief's capital coefficient data covering a number of manufacturing industries, plus several categories of mining, public utilities, transportation and housing failed completely.[1] But if each of these broad classes (such as manufacturing or transportation) is treated as a single industry, a pattern begins to emerge : industries heavily dependent on construction, such as transportation, public

CHART III

The v–m *Curve*



utilities and housing, have considerably higher magnitudes of v and m than is the case with manufacturing. What we really need, however, is not so much a cross-sectional study by industries, but the magnitudes of m and v of different varieties of assets fulfilling similar functions (stone or wooden houses, roads with deep or shallow foundations, high quality or ordinary tools, etc.) because practical choices are usually made between these. In the absence of such a study we shall assume that v as a function of m is expressed by the hypothetical v–m curve ABC on Chart III.[2] It must

[1] Harvard Economic Research Project, *Estimates of the Capital Structure of American Industries, 1939* (January 1950). Capital coefficients given there are ratios of capital to output. For our purposes, ratios of capital to value added would be more meaningful, but even this adjustment failed to give any results.

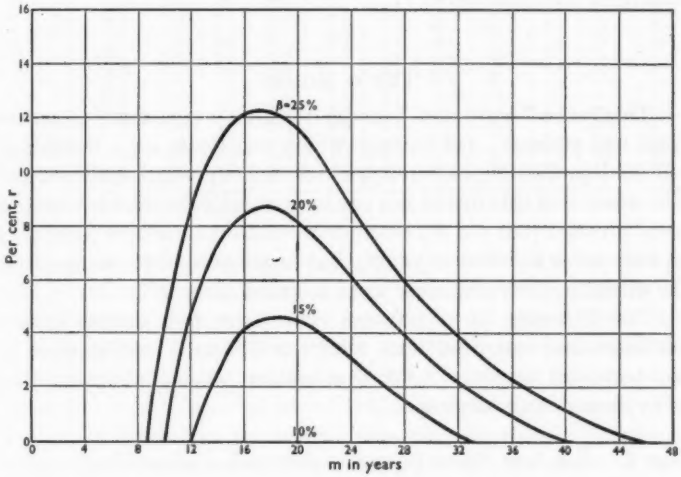
[2] The formula of the curve is $v = 4 - 0{\cdot}3m + 0{\cdot}01m^2$. Though I have tried to make it reasonable, it should not be taken too seriously.

have a positive slope in the relevant range (BC), because otherwise we'll be back at the pyramids. But a negative slope for very low magnitudes of m is possible; sometimes short-lived assets may be extremely inefficient. It is obvious, however, that it would not pay to stay on the AB part of the curve, and it can be omitted from consideration in the present case.[1]

BC has an *increasing* slope, because, among other reasons, obsolescence limits the effective life span of assets. This attribute

CHART IV

The r–m *Curves*



of the curve, however, is not as important as the positiveness of the slope itself.

Now that a large m has become expensive in terms of v, growth is not necessarily speeded up by increasing m, as it was in Case 1. The relationship between m and r has become more complex, and there exists an optimum m which maximises r. Chart IV shows the family of r–m curves for given values of β. Their exact shape and position depend, of course, on those of the v–m curve ABC on the basis of which they are drawn, but their general form appears quite reasonable.

A β of 10% gives no growth whatsoever, the maximum value of r being exactly zero for $m = 20$ years. As β increases, the r–m curve moves upward, but it is interesting that even with a relatively

[1] A short range of the curve to the left of B becomes relevant in Case 2 of the α model.

high β, r remains vulnerable to a low m : even a high propensity to save offers only a limited protection against the dissipation of savings on replacements when no depreciation (or replacement) reserves are set up.[1]

Case 3. Changing Prices

It is assumed here (as we did in Case 2 of Section II) that all prices change in the same proportion. Since neither v nor β are affected, there being no depreciation charges, the whole system is perfectly neutral to price changes and the results of Cases 1 and 2 remain unchanged, except that u—the real rate of growth—should be used instead of r.

IV

The α Model

This is the " capitalist " model in which investment is financed from two sources : net savings which constitute an α fraction of net (of depreciation) national product, and depreciation allowances. The essence of this model lies not in a variable fraction invested of total product (our old β), because a constant α yields a constant β as well (after the first m years), but in allowing β to emerge from the model in such a manner as to assure a given α.[2]

The financing of investment from these two sources creates mathematical complications which are hardly explainable in non-technical language. For that matter, some of them are hard to explain in any language.

Case 1. Constant Prices (v *and* m *Mutually Independent*)

The simplest expression of r as a function of m, v and α that I have been able to derive takes this form :

$$(9) \qquad r = \left(\frac{\alpha}{v} + \frac{1-\alpha}{m}\right)\left[1 - \frac{1}{(1-r)^m}\right]$$

which again cannot be solved explicitly for r. But by a short transformation it is possible to compute from it numerical illustrations given in Table IV.[3]

[1] It is curious that the optimum m (corresponding to the maximum r) falls with increasing β. Thus a β of 15% sets the optimum m near 18 years, while with a β of 25% the corresponding m falls to 16·5 years. This relation between β and m depends on the secondary characteristics of the v–m curve : that its slope be increasing, constant or slightly decreasing. If it should decrease sharply instead, the conclusion is reversed and a rising β will increase the optimum m.

[2] See expression (5.2) in the Appendix.

[3] Both sides of (9) are multiplied by m, and the latter is expressed as a function of rm, v and α. Then the method of Table III is used.

TABLE IV

The Behavior of r *as a Function of* m, v *and* a

rm.	a = 5%.						a = 10%.					
	v = 3.			v = 2.			v = 3.			v = 2.		
	r%.	m years.	β%.	r%.	m years.	β%.	r%.	m years.	β%.	r%.	m years.	β%.
0·1	1·7	6·0	52·3	2·5	4·0	52·3	2·2	4·5	69·8	3·3	3·0	69·8
0·2	2·2	9·2	36·0	3·3	6·1	36·0	3·3	6·1	54·3	4·9	4·1	54·3
0·3	2·4	12·4	27·9	3·6	8·3	27·9	3·9	7·7	45·0	5·8	5·1	45·0
0·4	2·5	15·8	23·1	3·8	10·5	23·1	4·3	9·4	38·7	6·4	6·3	38·7
0·5	2·6	19·2	19·8	3·9	12·8	19·8	4·5	11·1	34·3	6·7	7·4	34·3
0·6	2·6	22·8	17·5	4·0	15·2	17·5	4·7	12·9	30·9	7·0	8·6	30·9
0·7	2·6	26·4	15·8	4·0	17·6	15·8	4·8	14·7	28·3	7·1	9·8	28·3
0·8	2·7	30·2	14·5	4·0	20·1	14·5	4·8	16·6	26·3	7·2	11·1	26·3
0·9	2·6	34·0	13·4	4·0	22·7	13·4	4·9	18·5	24·6	7·3	13·3	24·6
1·0	2·6	37·9	12·5	4·0	25·3	12·5	4·9	20·5	23·2	7·3	15·6	23·2
1·1	2·6	41·9	11·8	3·9	28·0	11·8	4·9	22·5	22·0	7·3	15·0	22·0
1·2	2·6	46·0	11·2	3·9	30·7	11·2	4·9	24·5	21·0	7·3	16·3	21·0
1·3	2·6	50·2	10·7	3·9	33·5	10·7	4·9	26·6	20·1	7·3	17·7	20·1
1·4	2·6	54·5	10·2	3·9	36·5	10·2	4·9	28·8	19·4	7·3	19·2	19·4
1·5	2·5	58·9	9·8	3·8	39·2	9·8	4·8	30·9	18·7	7·3	20·6	18·7
1·6	2·5	63·3	9·5	3·8	42·2	9·5	4·8	33·1	18·1	7·2	22·1	18·1
1·7	2·5	67·8	9·2	3·8	45·2	9·2	4·8	35·4	17·6	7·2	23·6	17·6
1·8	2·5	72·4	8·9	3·7	48·3	8·9	4·8	37·7	17·2	7·2	25·1	17·2
1·9	2·5	77·0	8·7	3·7	51·4	8·7	4·7	40·0	16·7	7·1	26·7	16·7
2·0	2·4	81·8	8·5	3·7	54·5	8·5	4·7	42·4	16·4	7·1	28·3	16·4

Note: The underlined figures are the maximum magnitudes of *r*

Its most interesting aspect is the fact that r is almost completely independent of m, contrasting sharply with the results of Table III in the β model. When gross savings contain a " sound " provision for depreciation in addition to net savings, however modest the latter may be, growth is never in danger. Even with an a of 5% and a v of 3, an r of about 2·5% is virtually assured. For the United States in peace-time this may be quite a source of embarrassment, because failure to grow at the required rate creates unemployment, but for countries who know how to use their savings—certainly a blessing. An export of some of the accounting conservatism out of the United States and into less-developed countries might benefit all concerned. Depreciation accounting really sets up hidden reserves, and a glance at the β column shows what a large sacrifice of possible consumption may be involved even when a does not exceed some 5–10%.

r is practically independent of m because the model does not have to pay, so to speak, for replacement: the latter is automatically provided for by depreciation charges which are more than adequate. As a matter of fact, a closer examination of Table IV reveals that there even exists an m (and by no means a large one) which maximises r. It leads to the amusing conclusion that in a society represented by this model, output will grow slightly faster if capital stock is not too durable, and this is not because durable

capital is expensive, as was assumed in Case 2 of the β model, but only due to accounting peculiarities.

Case 2. Constant Prices (v *a Function of* m)

As soon as v becomes a function of m, that is, when greater capital longevity must be paid for, the insensitivity of r to m disappears and the r–m curve acquires a pronounced maximum. The exact position of the optimum m which maximises r depends on the magnitude of α and on the form of the v–m function, but on the whole there is little doubt that under reasonable conditions, it will be in the vicinity of the lowest point of the v–m curve : since for any value of m depreciation charges are automatically provided for, so to speak, from the outside, a higher m offers no particular advantage. On the other hand, a low m reduces v (until its minimum is reached), which is the only cost from the point of view of the model. Hence the movement towards that m which minimises v.[1]

Case 3. Changing Prices (v *and* m *Mutually Independent*)

In its logical structure, this case is similar to Case 3 of the β Model, but the heavy reliance of total savings on depreciation charges makes the real rate of growth highly sensitive to price changes, and thus leads to conclusions quite different from those of the other case. The formula expressing u as a function of α, v and i (or r) is more complex than ever and will be tucked away into a footnote.[2] At this late hour, we shall forego the quest for a maximum u and only try to determine the rate of growth of prices (the magnitude of i) which could eliminate growth altogether.

The Appendix (with the usual apologies to the reader) shows that a necessary but not a sufficient condition for $u \leqslant o$ is $\alpha \leqslant \frac{v}{m}$

[1] It is interesting that as α increases, the optimum value of m which maximises r is pushed somewhat to the left of that m which gives the lowest point on the v–m curve. I have not analysed this in any detail, but I believe that it is due to the same causes which created the maximum r in Case 1 : that a slightly lower m than would be expected on purely rational grounds yields a higher r because the lower m gives rise to larger depreciation charges.

[2] This formula is

$$\frac{u}{1-\frac{1}{(1+u)^m}} = \frac{\alpha}{v} \cdot \frac{1}{\left\{1 - \frac{\left[1-\frac{1}{(1+r)^m}\right](1-\alpha)}{rm}\right\}}$$

It cannot be solved explicitly for u; the right side can be readily computed for given α, v, r and m, and the magnitudes of u are obtained by equating the left side to the right by a process of successive approximations.

(which can also be expressed as $m \leqslant \frac{v}{a}$, or $v \geqslant am$, depending on the most convenient point of view). Should m be near 30 years, and v not below 3, this condition will be satisfied if $a \leqslant 10\%$, which is highly probable for many countries.

This, however, is not a sufficient condition, the actual outcome depending also on the degree of inflation. Table V gives the annual rate of growth of prices required to reduce u to zero.[1] For $a = 10\%$ with $v = 2$ or 3, or $a = 5\%$ with $v = 2$, the rise in prices must be very rapid indeed. But with $a = 5\%$ and $v = 3$, which is more reasonable, particularly for non-communist undeveloped countries, the elimination of growth (and even retrogression) becomes a distinct possibility, particularly if careless treatment of capital should reduce m. A strong inflation destroys depreciation charges in real terms to such an extent that a moderate net propensity to save is insufficient to finance replacement, let alone to provide for the expansion of the capital stock.

TABLE V

Annual Rate of Inflation (i) *Required to Eliminate Real Growth* (u = 0)

m.	$a = 5\%$.		$a = 10\%$.	
	$v = 3$.	$v = 2$.	$v = 3$.	$v = 2$.
	Per cent.		Per cent.	
5	1·4	3·3	3·1	7·5
10	2·7	4·9	6·3	13·2
15	3·3	6·0	8·8	23·3
20	3·8	7·3	12·3	∞
25	4·3	9·1	21·4	impossible
30	4·9	12·4	∞	,,
35	5·6	21·7	impossible	,,
40	6·6	∞	,,	,,
45	8·2	impossible	,,	,,
50	11·4	,,	,,	,,
55	20·6	,,	,,	,,
60	∞	,,	,,	,,

Comparing the results of the two models, we find that in the β Model the real rate of growth is highly sensitive to m, but is immune to inflation, while in the α Model, it is very vulnerable to inflation but does not depend as much on m.

* * * * *

[1] It is based on the formula

$$\frac{rm}{1 - \frac{1}{(1+r)^m}} = \frac{1-a}{1-\frac{am}{v}}$$

which is obtained from that presented in note 2 on p. 22 by taking $u = 0$.

Any person who has had the patience to get through these twenty-three pages (not to mention the next nine pages of the Appendix) must be so well aware of the limitations of the paper that there is no need to belabour them further. The large number of constants (which show amazing variability in real life) and of the simplifying assumptions (many of which do not exist) may have well given the reader a feeling of an analytical strait-jacket. A good deal of these defects can be remedied, but not before there is a greater assurance that the effort is worthwhile.

I hope very much that the paper has not given the impression that the subject of replacement and depreciation must necessarily be tied to models such as presented here. It is a large and important subject which has been considerably neglected in economics. If we reflect on the fact that some 50% of investment expenditures in the United States are made for replacement purposes and that over the period 1929–40 and 1947–51 depreciation charges (as defined by the United States Department of Commerce) exceeded personal savings by a ratio of almost 3 to 1, the potentialities for public policy in this field will become quite impressive. The next step is to investigate the proper form which this policy should take.

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MATHEMATICAL APPENDIX

List of Symbols

(In order of their appearance and with the model of their first appearance indicated.)

Model 1. t = time in years;
m = life span of capital assets in years;
G = annual gross investment;
r = relative annual rate of growth of G in current prices;
K = gross (of depreciation) stock of capital;
D = annual depreciation charges;
R = annual replacement expenditures.

Model 2. b = a constant;
a = depreciation rate = $1/m$;
z = a symbol used for abbreviation;
y = a symbol used for abbreviation.

Model 3. i = relative annual rate of growth of prices;
u = relative *real* annual rate of growth of G ($u = r - i$);
T = a symbol used for abbreviation.

Model 4. β = gross propensity to save = G/P;
v = capital coefficient;
P = annual gross national product;

H = a symbol used for abbreviation;
x = a symbol used for abbreviation;
L = a symbol used for abbreviation;
N = investment net of replacement per year ($N = G - R$);
$\bar{N}, \bar{G}, \bar{P}$ = the corresponding concepts in real terms.

Model 5. a = net (of depreciation) propensity to save;
W = a symbol used for abbreviation.

Throughout the paper it is assumed that $G = e^{rt}$, and that $r \geqslant 0$. No revaluation of capital assets takes place. Maximum conditions are established by equating the first derivative to zero, the nature of the problem making further proof unnecessary. In several cases complicated derivations of relatively unimportant propositions have been omitted, but they are available and will be furnished on request.

Model 1. One Kind of Investment. Constant Prices

Case 1. $t < m$

From

(1.1) $$G = e^{rt}$$

(1.2) $$K = \int_0^t e^{rt}dt = \frac{e^{rt} - 1}{r}$$

(1.3) $$D = \frac{K}{m} = \frac{e^{rt} - 1}{rm}$$

(1.4) $$\frac{D}{G} = \frac{1 - e^{-rt}}{rm}$$

Case 2. $t \geqslant m$

By definition,

(1.5) $$R_t = G_{t-m} = e^{r(t-m)}$$

(1.6) $$K = \int_{t-m}^{t} Gdt = \frac{e^{rt}(1 - e^{-rm})}{r}$$ (see text, pp. 3–4)

(1.7) $$D = \frac{K}{m} = \frac{e^{rt}(1 - e^{-rm})}{rm}$$

(1.8) $$\frac{D}{G} = \frac{1 - e^{-rm}}{rm}$$

(1.9) $$\frac{R}{G} = e^{-rm}$$

(1.10) $$\frac{R}{D} = \frac{rm}{e^{rm} - 1}$$

It can be readily shown that the derivatives of $\frac{D}{G}$, $\frac{R}{G}$ and $\frac{R}{D}$ with respect to r, m and rm are negative, and (by differentiating the numerator and denominator when necessary) that

(1.11) $$\operatorname*{Lim}_{rm \to 0}\left(\frac{D}{G}\right) = \operatorname*{Lim}_{rm \to 0}\left(\frac{R}{G}\right) = \operatorname*{Lim}_{rm \to 0}\left(\frac{R}{D}\right) = 1$$

(1.12) $$\operatorname*{Lim}_{rm \to \infty}\left(\frac{D}{G}\right) = \operatorname*{Lim}_{rm \to \infty}\left(\frac{R}{G}\right) = \operatorname*{Lim}_{rm \to \infty}\left(\frac{R}{D}\right) = 0$$

For D to be equal to R, the depreciation rate should be

(1.13) $$\frac{R}{K} = \frac{r}{e^{rm} - 1}$$

which is the reciprocal of an amount of annuity for m years invested at the rate of r (see text, p. 12).

MODEL 2. TWO KINDS OF INVESTMENT. CONSTANT PRICES

Symbols with subscripts will refer to specific investments; symbols without subscripts indicate averages for both investments. Assume $m_2 > m_1$.

Let

$$G = e^{rt} = b_1 e^{rt} + b_2 e^{rt} \tag{2.1}$$

Case 1. $t < m_1 < m_2$

It is obvious from (1.2) that $K_1 = \frac{b_1(e^{rt} - 1)}{r}$, $K_2 = \frac{b_2(e^{rt} - 1)}{r}$ and $K = \frac{e^{rt} - 1}{r}$. Hence,

$$a = \frac{D}{K} = \frac{a_1 K_1 + a_2 K_2}{K} = a_1 b_1 + a_2 b_2 \tag{2.2}$$

Thus a and $m = 1/a$ are constant.

Case 2. $m_1 \leqslant t < m_2$

By assumption, $R_2 = 0$.

From (1.6), (1.2) and (2.2),

$$a = \frac{a_1 K_1 + a_2 K_2}{K} = \frac{a_1 b_1 e^{rt}(1 - e^{-rm_1}) + a_2 b_2 (e^{rt} - 1)}{b_1 e^{rt}(1 - e^{-rm_1}) + b_2 (e^{rt} - 1)} \tag{2.3}$$

Here a is not a constant, and we cannot take m as its reciprocal because by the nature of the problem m is supposed to be constant, though if needed, it could be re-defined.

$$\frac{D}{G} = \frac{a_1 b_1 (1 - e^{-rm_1}) + a_2 b_2 (1 - e^{-rt})}{r} \tag{2.4}$$

$$\frac{R}{G} = \frac{b_1 e^{r(t - m_1)}}{e^{rt}} = b_1 e^{-rm_1} \tag{2.5}$$

because $R_2 = 0$. $\frac{R}{D}$ can be derived but it is too complicated to be of theoretical value.

Consider the special case when the second investment represents an accumulation of inventories, so that $a_2 = 0$. Then,

$$a = \frac{a_1 b_1 (1 - e^{-rm_1})}{b_1 (1 - e^{-rm_1}) + b_2 (1 - e^{-rt})} \tag{2.6}$$

$$\lim_{t \to \infty} a = \frac{a_1}{1 + \frac{b_2}{b_1}\left(\frac{1}{1 - e^{-rm_1}}\right)} \tag{2.7}$$

Over the period 1929–50 in the United States, investment in inventories comprised about 5% of investment in construction and producers' durables (all in constant prices).[1] Taking therefore $\frac{b_2}{b_1} = 0{\cdot}05$, and assuming $rm = 1$, we find that

$$\lim_{t \to \infty} a = 0{\cdot}93 a_1 \tag{2.8}$$

It therefore makes little difference whether G does or does not include investment in inventories.

Case 3. $t \geqslant m_2 > m_1$

Following the results of Cases 1 and 2, we can establish that

$$a = \frac{a_1 b_1 (1 - e^{-rm_1}) + a_2 b_2 (1 - e^{-rm_2})}{b_1 (1 - e^{-rm_1}) + b_2 (1 - e^{-rm_2})} \tag{2.9}$$

$$\frac{D}{G} = \frac{a_1 b_1 (1 - e^{-rm_1}) + a_2 b_2 (1 - e^{-rm_2})}{r} \tag{2.10}$$

[1] *Survey of Current Business Supplement, National Income and Product of the United States, 1929–50* (Washington, 1951), p. 146.

$$\frac{R}{G} = b_1 e^{-rm_1} + b_2 e^{-rm_2} \tag{2.11}$$

$$\frac{R}{D} = \frac{r(b_1 e^{-rm_1} + b_2 e^{-rm_2})}{a_1 b_1 (1 - e^{-rm_1}) + a_2 b_2 (1 - e^{-rm_2})} \tag{2.12}$$

We shall now prove that $m = \frac{1}{a}$ as given by (2.9) can be used as the average life span of both investments so as to obtain the expressions for $\frac{D}{G}$ and $\frac{R}{G}$ given by (1.8) and (1.9) respectively. $\left(\frac{R}{D}\right.$ can be omitted because it is the ratio of $\frac{R}{G}$ to $\left.\frac{D}{G}.\right)$ In other words, we want to show that

$$\frac{D}{G} = \frac{a_1 b_1 (1 - e^{-rm_1}) + a_2 b_2 (1 - e^{-rm_2})}{r} = \frac{1 - e^{-rm}}{rm} \tag{2.13}$$

and

$$\frac{R}{G} = b_1 e^{-rm_1} + b_2 e^{-rm_2} = e^{-rm} \tag{2.14}$$

Introduce the notation

$$b_1 e^{-rm_1} + b_2 e^{-rm_2} = z \tag{2.15}$$

$$a_1 b_1 (1 - e^{-rm_1}) + a_2 b_2 (1 - e^{-rm_2}) = y \tag{2.16}$$

m as given by (the reciprocal of) (2.9) can be expressed as

$$m = \frac{b_1(1 - e^{-rm_1}) + b_2(1 - e^{-rm_2})}{a_1 b_1 (1 - e^{-rm_1}) + a_2 b_2 (1 - e^{-rm_2})} = \frac{1 - (b_1 e^{-rm_1} + b_2 e^{-rm_2})}{a_1 b_1 (1 - e^{-rm_1}) + a_2 b_2 (1 - e^{-rm_2})} \tag{2.17}$$

because $b_1 + b_2 = 1$. Hence,

$$m = \frac{1 - z}{y} \tag{2.18}$$

and

$$y = \frac{1 - z}{m} \tag{2.19}$$

From (2.13), (2.14), (2.15) and (2.16),

$$\frac{D}{G} = \frac{y}{r} = \frac{1 - e^{-rm}}{rm} \tag{2.20}$$

$$\frac{R}{G} = z = e^{-rm} \tag{2.21}$$

Therefore,

$$y = \frac{1 - z}{m} \tag{2.22}$$

which is identical to (2.19). Hence, the expressions (2.13) and (2.14) are correct, and m as given by (2.17) can be used as the average life span of both investments.

These results can be generalised to include any number of investments. The remaining part of the Appendix (as well as the text of the paper) deals only with m. Strictly speaking, it is assumed not only that t is at least as large as the average m, but that t at least equals the largest m.

Model 3. Changing Prices

Case 1. $t < m$

Since $R = 0$, the results of Case 1 of Model 1 remain unchanged.

Case 2. $t \geqslant m$

All results of Case 2 of Model 1 not involving R remain unchanged.

$$R_t = G_{t-m} e^{im} = e^{r(t-m)+im} \tag{3.1}$$

$$\frac{R}{G} = e^{-m(r-i)} = e^{-um} \tag{3.2}$$

$$\frac{R}{D} = \frac{rme^{im}}{e^{rm} - 1} = \frac{rm}{e^{(r-i)m} - e^{-im}} = \frac{(u+i)m}{e^{um} - e^{-im}} \tag{3.3}$$

It is obvious that $\frac{\partial\left(\frac{R}{D}\right)}{\partial i} > 0$ and almost obvious that $\frac{\partial\left(\frac{R}{D}\right)}{\partial u} < 0$, because a change in u, with i fixed, means exactly the same change in r, and we know that the derivative of (1.10) in respect to r is negative. The relationship between $\frac{R}{D}$ and m is more complex.

$$\frac{\partial\left(\frac{R}{D}\right)}{\partial m} = \frac{(e^{rm}-1)(re^{im}+rime^{im}) - r^2me^{im+rm}}{(e^{rm}-1)^2} \tag{3.4}$$

$$\frac{\partial\left(\frac{R}{D}\right)}{\partial m} = \frac{re^{im}}{(e^{rm}-1)^2}\cdot[(e^{rm}-1)(im+1) - rme^{rm}] \tag{3.5}$$

Since the first part of the right side of (3.5) is always positive, we can concentrate on the expression in the brackets. Let

$$T = (e^{rm}-1)(im+1) - rme^{rm} \tag{3.6}$$

The value of i for which $T < 0$ is

$$i < \frac{re^{rm}}{e^{rm}-1} - \frac{1}{m} \tag{3.7}$$

Divide both sides by r;

$$\frac{i}{r} < \frac{e^{rm}}{e^{rm}-1} - \frac{1}{rm} \tag{3.8}$$

It can be shown that the magnitude of the right side of (3.8) is between $\frac{1}{2}$ and 1. Therefore, a sufficient but not necessary condition for $\frac{\partial\left(\frac{R}{D}\right)}{\partial m} < 0$ is $i < \frac{r}{2}$.

The maximum condition for $\frac{\partial\left(\frac{R}{D}\right)}{\partial m}$ is obtained from (3.6) by setting

$$T = (e^{rm}-1)(im+1) - rme^{rm} = 0 \tag{3.9}$$

It cannot be solved explicitly for m, but it can be shown that m is subject to the following conditions:

$$\frac{\partial m}{\partial i} > 0, \frac{\partial m}{\partial r} < 0$$

The proof is omitted because the subject is not sufficiently important.

To find the i which sets $\frac{R}{D} = 1$, start from (3.3)

$$\frac{R}{D} = \frac{(u+i)m}{e^{um}-e^{-im}} = 1 \tag{3.10}$$

which reduces to

$$im + e^{-im} = e^{um} - um \tag{3.11}$$

This cannot be solved explicitly for i, but Table II gives its numerical magnitudes.

Model 4. The β Model

Conditions are explained in the text. Note that $t \geqslant m$. Strictly speaking, a single m is assumed.

Case 1. Constant Prices (v *Independent of* m)

As shown in the text,

$$r = \frac{\beta}{v}(1 - e^{-rm}) \tag{4.1}$$

It is clear that

$$\frac{\partial r}{\partial \beta} > 0, \frac{\partial r}{\partial v} < 0, \frac{\partial r}{\partial m} > 0 \tag{4.2}$$

(4.1) cannot be solved explicitly for r, but numerical magnitudes can be derived by the method described on p. 16; they are given in Table III.

Case 2. Constant Prices ($v = f(m)$)

From (4.1) we have

$$r = \frac{\beta}{v}(1 - e^{-rm})$$

Define

$$v' = \frac{dv}{dm},\ v'' = \frac{d^2v}{dm^2} \tag{4.3}$$

We want to find the m which maximises r. From (4.1),

$$\frac{\partial r}{\partial m} = \frac{r(\beta e^{-rm} - v')}{v\left(1 - \frac{\beta m e^{-rm}}{v}\right)} \tag{4.4}$$

Consider the part of the denominator in the parentheses. Let

$$H = 1 - \frac{\beta m e^{-rm}}{v} \tag{4.5}$$

From (4.1)

$$\frac{\beta}{v} = \frac{r}{1 - e^{-rm}} \tag{4.6}$$

substitute (4.6) into (4.5):

$$H = \frac{e^{rm} - 1 - rm}{e^{rm} - 1} \tag{4.7}$$

A Maclaurin's expansion shows that the numerator of H, and therefore H itself, is positive (for $rm > 0$). Hence the denominator of (4.4) is positive and the sign of (4.4) depends only on its numerator. The maximum condition is now given by

$$v' = \beta e^{-rm} \tag{4.8}$$

which cannot be solved explicitly for m in terms of β. But by treating (4.1) and (4.8) as a system of simultaneous equations, it is possible to establish that

$$\frac{dm}{d\beta} = \frac{e^{-rm}(v - m\beta)}{(v'' + r\beta e^{-rm})(v - m\beta e^{-rm})} \tag{4.9}$$

The derivation of (4.9) is quite involved and not sufficiently important to justify the use of several pages.

Consider the part of the numerator of (4.9) in parentheses. Let

$$L = v - m\beta = v\left(1 - \frac{\beta m}{v}\right) \tag{4.10}$$

But by (4.1),

$$\frac{\beta}{v} = \frac{r}{1 - e^{-rm}} \tag{4.11}$$

therefore

$$L = v\left(1 - \frac{rm}{1 - e^{-rm}}\right) = v\left(\frac{1 - e^{-rm} - rm}{1 - e^{-rm}}\right) \tag{4.12}$$

Let $rm = x$. Consider the part of the numerator of (4.12) in parentheses. Prove that

$$1 - e^{-x} - x < 0 \tag{4.13}$$

We shall make use here and elsewhere in the paper of the following proposition for $x > 0$:

$$F(x) > 0, \text{ if } F(0) = 0 \text{ and } F'(x) > 0 \tag{4.14}$$

If the sign of $F'(x)$ cannot be established directly, but

$$F'(0) = 0 \text{ and } F''(x) > 0 \tag{4.15}$$

$$\text{then } F'(x) > 0 \text{ and therefore } F(x) > 0$$

Sometimes it may be necessary to take several derivatives before the sign of $F(x)$ can be determined. The same proposition, but of course reversed, can be used to establish that $F(x) < 0$.

Applying this method to (4.13), we have:

$$F'(x) = e^{-x} - 1 < 0 \tag{4.16}$$

Therefore (4.13) and the numerator of (4.9) are negative.

The expression in the second parentheses of the denominator of (4.9) is positive because (4.5) is positive. Therefore,

$$\frac{dm}{d\beta} < 0 \tag{4.17}$$

if

$$v'' > -r\beta e^{-rm} \tag{4.18}$$

Case 3. Changing Prices

See the statement in the text. The formal proof is omitted.

Model 5. The a Model

Conditions are explained in the text. Note that $t \geqslant m$. Strictly speaking, a single m is assumed.

Case 1. Constant Prices (v *Independent of* m)

From the nature of this model,

$$G = a(P - D) + D = aP + D(1 - a) \tag{5.1}$$

Divide both sides by G, and substitute $\frac{P}{G} = \frac{1}{\beta}$, and $\frac{D}{G} = \frac{1 - e^{-rm}}{rm}$ from (1.8);

$$\frac{a}{\beta} + \frac{(1 - e^{-rm})(1 - a)}{rm} = 1 \tag{5.2}$$

From (4.1), $\beta = \frac{rv}{1 - e^{-rm}}$. Inserting it into (5.2), we finally get

$$r = \left(\frac{a}{v} + \frac{1 - a}{m}\right)(1 - e^{-rm}) \tag{5.3}$$

We shall try to find the value of m which, for given a and v, maximises r.

$$\frac{\partial r}{\partial m} = \left(\frac{a}{v} + \frac{1 - a}{m}\right)\left(m\frac{\partial r}{\partial m} + r\right)e^{-rm} + (1 - e^{-rm})\left(-\frac{1 - a}{m^2}\right) \tag{5.4}$$

From (5.3),

$$\frac{a}{v} + \frac{1 - a}{m} = \frac{r}{1 - e^{-rm}} \tag{5.5}$$

Substituting (5.5) into (5.4), we get, after a series of transformations,

$$\frac{\partial r}{\partial m} = \frac{r^2m^2e^{rm} - (e^{rm} - 1)^2(1 - a)}{m^2e^{rm}(e^{rm} - 1 - rm)} \tag{5.6}$$

The denominator of (5.6) is positive because (4.7) is positive. Hence the sign of (5.6) depends on that of the numerator only.

The maximum value of r with respect to m is given by

$$r^2m^2e^{rm} - (e^{rm} - 1)^2(1 - a) = 0 \tag{5·7}$$

or

$$\frac{r^2m^2e^{rm}}{(e^{rm} - 1)^2} = 1 - a \tag{5.8}$$

The explicit solution of (5.8) for m is impossible. The sign of $\frac{\partial m}{\partial a}$ from (5.8) can be established after a long series of manipulations which are not sufficiently important to be given here. They show that

$$\frac{\partial m}{\partial a} < 0 \text{ for } rm \leqslant 3{\cdot}1 \tag{5.9}$$

which is quite sufficient for our purposes.

Case 2. Constant Prices ($v = f(m)$)

v' and v'' are defined as in (4.3).

From (5.3)

$$r = \left(\frac{a}{v} + \frac{1 - a}{m}\right)(1 - e^{-rm}) \tag{5.10}$$

where $v = f(m)$. As in the preceding case, we want to find the value of m which

maximises r. Differentiating (5.10) in respect to m and substituting (5.5) in the appropriate place, we emerge with

$$\frac{\partial r}{\partial m} = \frac{r^2e^{rm} - (e^{rm}-1)^2\left(\frac{av'}{v^2} + \frac{1-a}{m^2}\right)}{e^{rm}(e^{rm}-1-rm)} \tag{5.11}$$

Since the denominator of (5.11) is positive because (4.7) is positive, the sign of (5.11) depends on that of the numerator only. Equating the numerator to zero to get the maximum condition and solving it for v', we obtain

$$v' = \frac{v^2}{am^2}\left[\frac{r^2m^2e^{rm}}{(e^{rm}-1)^2} - (1-a)\right] \tag{5.12}$$

The expression in the brackets can be zero, positive or negative, so that the optimum m can be at the lowest point B on the v–m curve on Chart III, or to its right or left. Numerical examples show that for reasonable magnitudes of the variables, v' is apt to be close to zero, and therefore—the optimum m not far from B.

Attempts to derive $\frac{dm}{da}$ from (5.12) have not given satisfactory results. I don't believe that any additional effort is justified.

Case 3. Changing Prices

By definition,

$$N = a(P-D) + D - R = aP + D(1-a) - R \tag{5.13}$$

also,

$$P = \frac{G}{\beta} = \frac{e^{rt}}{\beta} \tag{5.14}$$

From (1.7) and (3.1),

$$D = \frac{e^{rt}(1-e^{-rm})}{rm} \tag{5.15}$$

and

$$R = e^{r(t-m)+im} \tag{5.16}$$

Substitute (5.14), (5.15), and (5.16) into (5.13):

$$N = e^{rt}\left[\frac{a}{\beta} + \frac{(1-e^{-rm})(1-a)}{rm} - e^{-im}\right] \tag{5.17}$$

The deflation of (5.17) gives

$$\bar{N} = e^{ut}\left[\frac{a}{\beta} + \frac{(1-e^{-rm})(1-a)}{rm} - e^{-im}\right] \tag{5.18}$$

By definition,

$$u = \frac{\bar{N}}{\bar{P}v}; \tag{5.19}$$

replacing $\bar{N}$ by (5.18), and expressing β in terms of u, we derive after several simplifications

$$\frac{u}{1-e^{-um}} = \frac{a}{v}\cdot\frac{1}{1-\frac{(1-e^{-rm})(1-a)}{rm}} \tag{5.20}$$

Like so many of our results, this expression cannot be solved explicity for u. We shall only investigate here the conditions which give $u \leqslant 0$. First we prove that (5.20) varies directly with u.

$$\frac{\partial\left(\frac{u}{1-e^{-um}}\right)}{\partial u} = \frac{1-e^{-um}-ume^{-um}}{(1-e^{-um})^2} \tag{5.21}$$

The denominator of (5.21) is of course positive. Prove that the numerator is also positive. Let $um = x$ and

$$W(x) = 1 - e^{-x} - xe^{-x} \tag{5.22}$$

We use the procedure suggested in (4.14) and (4.15). Clearly, $W(O) = 0$.

$$W'(x) = e^{-x} + xe^{-x} - e^{-x} = xe^{-x} \tag{5.23}$$

Thus, $W'(O) = 0$, $W(x) > 0$ for $x > 0$, and $W'(x) < 0$ for $x < 0$. In other words, the slope of $W(x)$ is positive in the first quadrant and negative in the second, while $W(O) = 0$. Therefore, for any x, $W(x) > 0$, and

$$\frac{\partial\left(\frac{u}{1-e^{-um}}\right)}{\partial u} > 0 \tag{5.24}$$

Now, by differentiating the numerator and denominator of the left side of (5.20) we find that

$$\lim_{u \to 0}\left(\frac{u}{1-e^{-um}}\right) = \frac{1}{m} \tag{5.25}$$

On the right side of (5.20) the expression $\frac{1-e^{-rm}}{rm} = \frac{D}{G}$ by (1.8) varies inversely with r, and it is easy to see that the whole right side of (5.20) varies inversely with r as well. Therefore, an increase in r reduces (5.20) and by (5.24) reduces u. This shows that $\frac{\partial u}{\partial r} < 0$ and of course $\frac{\partial u}{\partial i} < 0$; in other words, inflation reduces the real rate of growth. (I tried to get these two derivatives by direct differentiation but the mathematics became rather involved.)

To find the asymptote approached by the right side of (5.20) as r increases we take

$$\lim_{r \to \infty} \frac{a}{v} \cdot \frac{1}{1 - \frac{(1-e^{-rm})(1-a)}{rm}} = \frac{a}{v} \tag{5.26}$$

because

$$\lim_{r \to \infty} \frac{1-e^{-rm}}{rm} = 0 \tag{5·27}$$

by (1.12). Hence the necessary but not sufficient condition for $u \leqslant 0$ is by (5.25) and (5.26)

$$\frac{1}{m} \leqslant \frac{a}{v} \tag{5.28}$$

or

$$a \leqslant \frac{v}{m} \tag{5.29}$$

No degree of inflation can reduce u to zero if $a > \frac{v}{m}$.

To find the exact value of i which gives $u = 0$, and therefore $r = i$, we obtain from (5.20) and (5.25),

$$\frac{a}{v} \cdot \frac{1}{1 - \frac{(1-e^{-rm})(1-a)}{rm}} = \frac{1}{m} \tag{5.30}$$

which can be reduced to

$$\frac{1-e^{-rm}}{rm} = \frac{1 - \frac{am}{v}}{1-a} \tag{5.31}$$

Numerical magnitudes of $r = i$ from (5.31) are given in Table V.

A CONTRIBUTION TOWARDS A THEORY OF CUSTOMS UNIONS

PART I

§ 1. DOES a Customs Union between some of the countries in a protectionist world improve upon, or worsen, the allocation of resources in the world as a whole? And is the gain larger—or the loss smaller—when the countries uniting are rival or when they are complementary? The following note tries to answer these two questions, using a very simple model.

§ 2. Assume that there are three countries and three commodities. Let all industries in all countries show constant costs of production over the relevant range. Assume that demand conditions in all the countries are given (this may be interpreted to mean that we take as known the relative prices of consumer goods; but it is better to think of it as meaning that we take as known the relative quantities of consumer goods). Assume that prior to the Union there was a given *ad valorem* tariff on all trade between all countries; and that after the Union there is no tariff within the Customs Union area and a given *ad valorem* tariff on all other trade.

§ 3. We may depict world production conditions by a matrix:

	α	β	γ
A	1	14	29
B	2	12	30
C	14	13	1

where A, B and C are countries, α, β and γ are commodities, and the figures show the unit costs of production (expressed in "dollars" or "gold").

§ 4. Given the resources in each country, the above cost matrix may be expressed in the form of a productivity surface for each country; in our simple model each surface is a plane in three-dimensional space.

§ 5. Fig. 1 illustrates pictorially the world production data corresponding to the matrix of § 3. Working in terms of productivities (*i.e.*, the reciprocals of the costs given in the matrix) we measure along each axis the amount of a commodity that can be produced per unit expenditure in each country. (The alternative production possibilities attainable with a given expenditure would be given for any country by joining together the appropriate points on each of the three commodity axes—*e.g.*, the plane

joining the three A-points would give these alternative production possibilities per unit expenditure, for Country A.)

§ 6. The problem posed in § 1 concerns a world with tariffs. It is clear that the answer to the problem is going to depend partly upon the *level* of the universal *ad valorem* tariff. It is convenient to distinguish at the outset two critical values of this tariff: first, there is some value of the tariff which is so low that it is insufficient to protect any of the nine industries in the world—in the example in § 3 the smallest international cost difference between the cheapest and the second cheapest source is 3·4%; therefore no tariff of less than 3·4% has any effect upon the

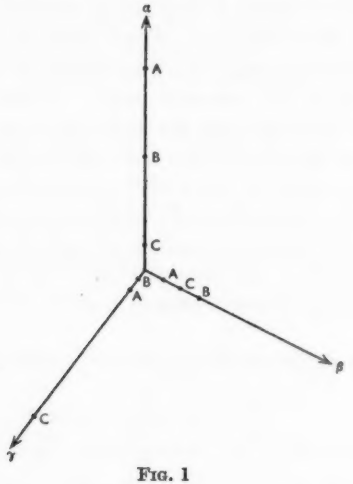

FIG. 1

international allocation of resources, so that the removal of the tariff by Customs Union can also make no difference (we are not here concerned with distributional effects). Secondly, there is some value of the tariff which is so high that all of the nine industries are effectively protected by it (in the above example this value is 2,900%, to protect B's production of γ against competition from C, B's cost being thirty times as great as C's.)

§ 7. Cases where the tariff lies at or above this second critical value of the tariff—where it is so high as to protect all industries—may be examined by reference to Fig. 1. The comparison to be made is between the situation where all the points are operative—*i.e.*, even the highest-cost industries (γ in B, α in C and β in A) are producing; and the situation where some one pair of countries *unites and substitutes* lower-cost for higher-cost activities. Thus,

for example, if A and B form a Union, A's production of α and γ will replace B's higher-cost production of these two commodities; while B's production of β will replace A's higher-cost production of this commodity. The resulting allocation of resources is not optimal; but it is better than that resulting from an all-round tariff which is so high as to protect all producers. Thus, for tariff values equal to or above the second critical value the answer to the first question in § 1 is that any Customs Union must bring an improvement in the world allocation of resources.

§ 8. The extent of this world gain depends directly upon the extent of the cost-difference, in respect of each of the three commodities, as between the two uniting countries. The greater these differences, the more the world benefits from the Union. Can we then answer, for this particular case of tariffs great enough to protect all industries, the second question of § 1: are Unions more advantageous between rival or complementary economies?

§ 9. The first thing is to understand what is meant by "rival" and "complementary." There seem to be only two possibilities: the terms could refer to degree of similarity in respect of demand (*i.e.*, substitutability in consumption) or to degree of similarity in costs (*i.e.*, substitutability in production). We shall, for the present, dismiss the first possibility, because we have assumed a given demand pattern; [1] we therefore take "rival" economies to refer to countries with similar costs, and complementary economies to refer to countries with dissimilar costs.

§ 10. Two complications attaching to this concept are apparent. Since "costs" is a multi-dimensional concept, there is in general no single measure of the degree of similarity. We have an ordinary *numéraire* situation. Secondly, the concept of similarity is a *relative* one. Consider the following cost situation:

	α	β	γ
A	1	3	30
B	3	1	28

Are the costs of A and B similar or dissimilar? Such a question is meaningless. (It remains meaningless even if there is only one commodity.) In specially chosen cases there is, however, a definite meaning to the question: are A's and B's costs more

[1] The literature dealing with the problem under review does not suggest that its authors were trying to analyse the influence of similar and dissimilar demand structures. Nevertheless, this latter plays just the same kind of role in determining which are favourable Customs Unions as do the cost structures. See § 28, below.

similar than A's and C's costs? For instance, if we choose the following figures:

	α	β	γ
A	1	3	30
B	3	1	28
C	12	15	1

then we may say that A's and B's costs are more similar than A's and C's (or B's and C's). If we choose instead the following figures:

	α	β	γ
A	1	3	30
B	3	1	28
C	2	2	29

then A's and B's costs are less similar than A's and C's (or B's and C's).

Finally, if we choose the following figures:

	α	β	γ
A	1	3	30
B	2	1	2
C	15	3	1

then we cannot say that either pair of countries has "more similar" costs.

§ 11. Bearing in mind these complications, the question whether a Customs Union brings greater gain when its members have complementary or similar economies can now be answered at once for the case where the Union is formed in a world where tariffs are so high as to protect all industries. The gain is greater for a Union between complementary economies (whenever these can be defined). This is obvious because both the gain and the complementarity are measured by the cost differences.

§ 12. We have considered the effect of Customs Unions for two limiting cases of a protectionist world: where protection is so low as to be totally ineffective and where it is so high as to be effective for all sources. The more general case is where the world tariff lies somewhere between these limits, so that prior to the Customs Union certain industries in certain countries which would have to close under free trade are in production; but certain others have too high costs to compete even behind the tariff wall. This intermediate case may be depicted diagrammatically by blacking out points near the origin of the production diagram—the blacked-out points being those which cannot produce with the given level of world tariff. In the example illustrated in Fig. 2 in the absence of any Customs Union, Country A produces α and γ and imports β from its cheapest source, B.

Country B produces β and α and imports γ from C. Country C produces γ and β and imports α from A.

The effect of a Customs Union upon the efficiency of production of any commodity is immediately seen by reference to the *ranking* of A, B and C along that commodity axis. The principle becomes clearer when we consider a larger number of

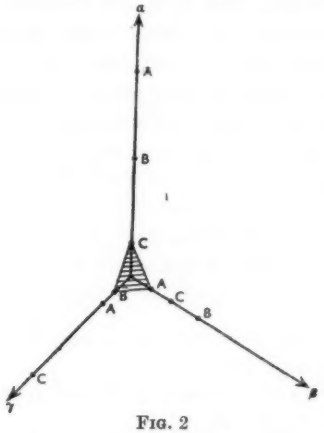

FIG. 2

countries (Fig. 3). Thus, suppose there are six countries with varying production costs. Consider their comparative costs for the commodity γ. Three of them, B, L and N, have costs so high as to be unable to compete even behind the pre-Customs-Union tariff wall. The rest are all supplying their home markets prior to the Union; and C is supplying itself and also B, L and

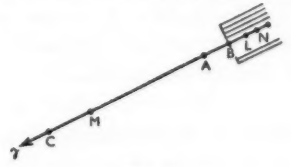

FIG. 3

N with γ. Any Union between a country with costs less than those of B but greater than those of C and a country with costs greater than those of B will bring a loss of efficiency (the loss falls to zero in the limiting case of Union between B, L or N with C). Any Union between countries having costs less than those of B will bring a gain in efficiency.[1] In other words, Unions between

[1] Is this the point Prof. Viner has in mind when he writes "the greater the correspondence in kind of products of the range of high-cost industries as between the

countries on opposite sides of the tariff point bring loss (in the limiting case the loss may fall to zero). Unions between countries on the same side of the tariff point bring gain. The gain is greater, or the loss is less, the more *complementary* are the pair of countries which form the union—*i.e.*, the more different their costs.

§ 13. This examination of a single commodity has served to illustrate the principle that it is the ranking of the countries, together with the value of the tariff (which fixes the critical point of division between low-cost and high-cost, or "actually competing" and not "actually competing", countries [1]) that determines which Customs Unions are beneficial and which harmful.

It is clear that in the general case there may be as many different rankings as there are commodities. Neither the degree of gain for a Union between two low-cost countries, nor even the composition of the group of low cost, *i.e.*, "actually competing" countries, will in general be the same for different commodities. To return to the three-county case of Fig. 2.

With regard to Commodity α A and B are in the low-cost group, C is high cost.
With regard to Commodity β B and C are in the low-cost group, A is high cost.
With regard to Commodity γ C and A are in the low-cost group, B is high cost.

It is still true for each commodity that a Customs Union brings loss of efficiency if it links countries on opposite sides of the critical cost point, and gain if it links countries on the same side of this point. But in general any given Union will simultaneously affect costs favourably in some industries and unfavourably in others. Thus a Union between A and B in Fig. 2 would lead to lower cost of production of α, unaltered costs for β, but higher costs for γ. The total effect can be measured only if we know the magnitude (as well as the direction) of each cost difference and also the *valuation* of commodities in terms of each other (*i.e.*, the weights for the different components of production).

§ 14. It is by now obvious that since the gain or loss of a Union is determined by the ranking of the countries' costs with respect to each other and to the tariff, it cannot be independently determined by the different criterion of similarity or complemen-

different parts of the Customs Union which were protected by tariffs in both of the member countries before Customs Union was established" the more likely is the Union to operate in the free trade direction? *Customs Union Issue*, p. 51.

[1] J. E. Meade, *Economica*, May 1951, p. 191.

tarity, even where this concept can be given a meaning. That the latter criterion alone does not serve can be easily illustrated by setting up special examples.

Thus consider the following cost set :

	α	β	γ
A	1	1	30
B	1	2	29
C	15	15	1

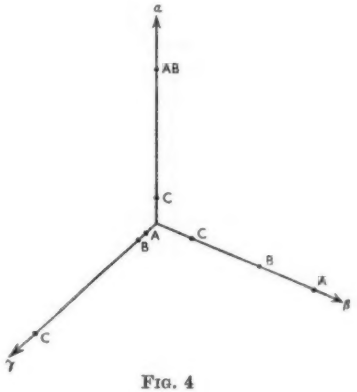

FIG. 4

A and B are more *similar* than A and C. Suppose the tariff is set before Union so as to protect all industries except α and β in C and γ in A and B. The gains and losses for Unions between A and B, and A and C may be tabulated as follows :

	In respect of :			Total effect (assuming the units of α, β and γ have the same value in consumption).
	α	β	γ	
A B Union	0	small gain	0	Small gain
A C Union	0	0	0	0

In this case the Customs Union between similar economies is more advantageous.

Suppose however that the tariff left unprotected only γ in A and B. The gains and losses from Unions would then be as follows :

	α	β	γ	Total effect.
A B Union	0	small gain	0	Small gain
A C Union	large gain	large gain	0	Large gain

With this tariff, Union between similar economies brings the same small gain as in the previous example, while Union between complementary economies brings a larger gain.

Suppose now that the pre-Union tariff left unprotected α and β in C and γ in A. The gains and losses would be as follows :

	α	β	γ	Total effect.
A B Union .	0	small gain	large loss	Loss
A C Union .	0	0	0	0

Here, Union between similar economies brings a loss.

Now choose slightly different costs, as follows :

	α	β	γ
A	1·0	1	30
B	0·9	2	30
C	15	15	1

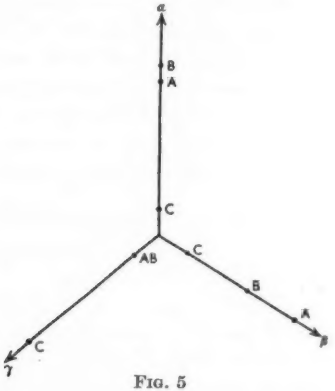

FIG. 5

A and B still have more similar costs than A and C. But the gain and loss situation is changed. For a tariff leaving γ and β in C and γ in A and B unprotected, we get :

	α	β	γ	Total effect.
A B Union .	small gain	small gain	0	Gain
A C Union .	small loss	0	0	Loss

In this case Union between similar economies brings gain, between complementary ones loss.

For a tariff leaving only γ in A and B unprotected, we get :

	α	β	γ	Total effect.
A B Union .	small gain	small gain	0	Gain
A C Union .	large gain	large gain	0	Large gain

In this case the Customs Union between complementary economies brings the greater gain.

Examples of any sort can be constructed. However, *if* two Unions both offer a gain, the one offering the greater gain is, definitionally, the Union between the more complementary pair of countries. And conversely, if two Unions both offer a

loss, the one offering the smaller loss is the Union between the more complementary pair of countries. This conclusion applies when tariffs are between the lower and the upper critical level. As soon as the tariff exceeds the upper level (effective for all industries in all countries) Union between complementary economies is unambiguously more advantageous.

§ 15. It seems that the paradoxical conclusion suggested by Professor Viner—that complementarity between members of a Customs Union is likely to bring loss, and similarity to bring gain—refers to the fact that Union between countries on opposite sides of the "tariff point" (and therefore on opposite extremes of the scale of costs) brings misdirection of resources. This is true. Nevertheless, provided such Unions are excluded, then the common-sense point that countries with widely different production advantages stand to gain most through Union still holds; subject to the prescribed restrictions, the more the economies differ the greater the gain from Union.

§ 16. How far is the above analysis invalidated when the highly simplified assumptions of § 2 are dropped? It has been seen that the number of countries can be extended indefinitely beyond three without affecting the analysis. It is also obvious that the number of commodities can be similarly extended.

The assumption as regards the Tariff may also be broadened without affecting the method of analysis. Suppose, for instance, that we wish to compare the situation of an all-round tariff of 75% and no Customs Union with the situation of a tariff of 95% operating between all countries except two, which form a Customs Union. The analysis would be similar, but account would have to be taken of the additional shift occurring as a result of the entry into production of those sources having costs between 75 and 95% above the cheapest source. Discriminating tariffs and Customs areas with preferential instead of zero tariffs could also be introduced.

The assumption of measurable and constant costs and the assumption of given demand are more fundamental. These assumptions are removed in Parts II and III.

Part II

§ 17. "Cost" is multi-dimensional: it consists of labour, land, machines, etc., etc.

The "technical production function" for any one industry, which may or may not be identical for different countries, shows

how (physical) output is dependent upon the (physical) quantities of all of these variables.

§ 18. If we try to compare "real cost" per unit output in different countries, we find that the cost in each country is represented by a different vector, *i.e.*, factor combination in the multi-dimensional cost space. The different countries use factor bundles of *different* composition. No statement can be made comparing these different real-cost bundles *except* by getting the factors *valued*. This can be done only by introducing demand which evaluates outputs and (in conjunction with technical functions) determines relative factor prices. (This situation prevails whether or not we assume that for any given industry the technical production function is identical for the different countries.)

It follows that "real" cost per unit output has no meaning which is independent of tastes.

One can escape this conclusion only if one believes in some single measurable (at least ordinally measurable) subjective "pain cost" which one regards as the "ultimate" cost—*e.g.*, subjective pain of labour put forth. This idea is not acceptable to the present writers.

§ 19. Since there is no meaning to "real cost per unit," there is also no meaning to "productivity per unit" (reciprocal of unit cost). The only definable thing is *total production* (a physical bundle) resulting from the (total) input of given initial resources. Normally there are alternative patterns of total production, *e.g.*, it is usually possible to produce a bundle containing much of α and little of β or rather less α and rather more β, etc., etc.

Thus any attempt to interpret "cost" deteriorates into foregone alternative production, or "opportunity" cost. It follows that the only meaning that can be given to the statement that the real cost of an amount q of a commodity α in any country (area, firm) is higher than in some other, is that the amount of a given alternative good foregone is higher—*irrespective of the total resources or input that goes to get that output*. In this sense there are as many different measures of the "cost" of a commodity as there are other commodities. Thus, whether we look at the matter from the "real" cost or the "opportunity" cost aspect we are looking at the same thing and we come to the same conclusion: cost is multi-dimensional.

§ 20. The fact that neither cost nor utility is measurable does not affect the determinateness or otherwise of "equilibrium." Given taste functions, technical functions and initial resources

and "Standards of Behaviour," [1] then commodity prices, commodity quantities, factor prices and allocation of resources ("factor" quantities) are all determined simultaneously by the economic equations. But the variables are mutually interdependent, and values (prices) resulting from their interaction cannot then be used to explain variations in one of the variables in isolation (Pareto, *Manuel d'Économie Politique*, p. 638).

§ 21. It follows that a cost matrix can represent nothing more than a set of "amounts foregone" of some *given* alternative commodity; and that we shall have as many such matrices as there are commodities. Not only does the magnitude of the figures change with the *numéraire*, but the ranking (between countries, for any given product) must change *for at least one* of the possible *numéraires* provided only $n > 1$. In this sense a cost matrix is arbitrary, since one can always find another, equally valid, which reverses the position of the countries, making that which was the low-cost country a "high-cost" country.

§ 22. In the light of these considerations, what is left of the analysis of Part I?

That analysis is evidently oversimplified. However, the cost data, though they give no unique ranking of countries even in respect to a single good, nevertheless provide important information —*i.e.*, an n — 1-dimensional surface (which is flat for constant substitution rates) for each country, depicting all possible alternative input and output combinations, given the initial resources.

In what follows below we shall try to show that with costs properly re-interpreted so as to dispense with the indefinable concept of measurable "real" cost, we shall arrive back at the conclusions reached, in a practical if inaccurate manner, in §§ 14 and 15 of Part I. The fundamental principle that gets us there —that Unions which bring the world nearer to a set of efficient world-production arrangements are advantageous—is not dependent upon measurable real cost.

§ 23. *Efficient Production with Two Countries and Two Goods.* Consider first two countries, each capable of producing two goods. Assume that the "Production Opportunities" of each country may be depicted by an area bounded by a straight line. Thus (Fig. 6) Country A may produce q units of α or r units of β or any *linear* combination of q and r. This means we assume the substitution rate of α for β is constant at $\frac{q}{r}$. Country B has similarly

[1] V. Neumann and Morgenstern, *Theory of Games*, Ch. 1, Section 4.

production opportunities allowing q' of α or r' of β or any linear combination, the substitution rate between α and β being $\frac{q'}{r'}$.

We may, therefore, write out cost (or production) matrices as we did in Part I, by transposing the figures so that they measure *substitution* (or transformation) *rates between pairs of commodities.* In doing this we dispense with the need to measure unit cost : we merely posit the existence of a production function showing

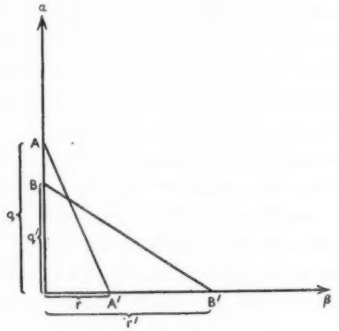

FIG. 6

alternative (total) production combinations possible in each country, with its resources.

Inter-area specialisation (and hence Customs Union leading to it) gives a gain (*i.e.*, makes possible the consumption of more of some commodities with less of none) whenever production–substitution rates differ, *i.e.*, $\frac{q}{r} \neq \frac{q'}{r'}$. Geometrically, there is gain from international re-allocation of factors whenever the *slopes* of the lines AA' and BB' differ (irrespective of the intercepts).[1]

This may be shown as follows :

Sum the production possibilities AA' and BB' of the two countries. This gives TWV (Fig. 7).

Suppose the consumption pattern is rigidly fixed, being the same in both countries. This may be depicted by drawing a line OK through the origin of our production–opportunity diagram, the slope of which gives the fixed ratio in which α and β are consumed (Fig. 7). The sum of the consumption amounts of α and

[1] Except in the special case where the consumption pattern is such as to give directly, without international exchange, the complete specialisation of one country upon its most advantageous line of production. This implies that this country consumes none of the other commodity, at any price.

β in A and B acting in isolation are given by the sum of the co-ordinates of P and Q. It is easily proven that the total consumption amounts of α and β for A and B acting jointly (as a single-producing area) is greater than this, *i.e.*, that the co-ordinates of point R in Fig. 7 are greater than the sum of the co-ordinates of P and Q.[1]

It then follows, from the argument in Part I and the present paragraph that—excluding the limiting case where consumption distribution is such as to coincide with production at cheapest source only, *i.e.*, consumption of one good (the cheapest) only—

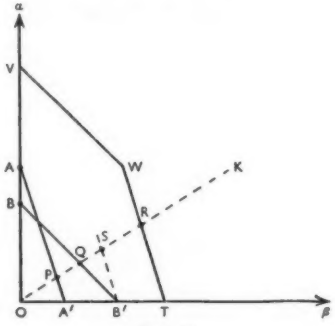

FIG. 7

there is gain from international exchange whenever the rates of substitution between products differ from one country to another.

§ 24. It is possible to extend the analysis to cover the case of "varying returns." In this case each country would have a series of alternative substitution rates for each commodity pair. Geometrically, suppose a country's production possibilities for two commodities are represented in a system of co-ordinates showing combinations of the two commodities (as in Fig. 7). The country's production possibilities lie in an area bounded by some sort of line or curve. If the rate of substitution between a pair of commodities in the given country varied discontinuously, this could

[1] *Proof:* In Fig. 7, draw $B'S$ parallel to $A'P$, intersecting OK at S.
$B'T = OA'$ (*by construction*).
$A'P$ parallel to $B'S$ (*by construction*).
$\therefore\ OP = SR$.
S lies to right of Q, since the slope of $B'S$ is greater than that of $A'P$. Since total consumption for A and B acting jointly is OR, and the total consumptions of the two countries acting separately is $OQ + SR$, there is a positive amount QS by which total consumption for A and B acting jointly exceeds total consumption for A and B acting separately, provided only that the slope of $AA' \neq$ slope of BB'.

be depicted geometrically by showing the production possibilities for this country as an area bounded by a succession of linear segments of increasing slopes (like the line *VWT* in Fig. 7). If the boundary were known to be in fact a continuous curve, it could still be approximated as closely as we wished by a series of straight lines. The analysis for the case of " varying returns " can proceed on the same lines as for the case where each country has a straight-line production boundary.

§ 25. *Efficient Production with Three Countries and Three Goods.* The " Customs Union Issue " proper—*i.e.*, the issue of

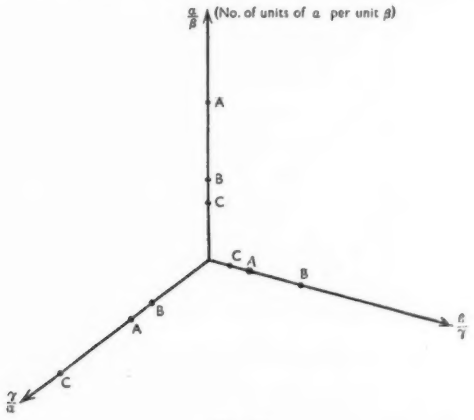

FIG. 8

discriminatory versus non-discriminatory tariffs between countries —can obviously enter only when there are at least three countries.

For three countries producing three commodities, with constant substitution rates, we shall then have production conditions depicted by a matrix of the following type. $\left(\frac{\alpha}{\beta}\right.$ gives the number of units of α that can be obtained by giving up 1 unit of β.$\left.\right)$

	$\frac{\alpha}{\beta}$	$\frac{\beta}{\gamma}$	$\frac{\gamma}{\alpha}$
A	1/1	1/7	7/1
B	1/2	1/3	6/1
C	1/3	1/15	45/1

Any one of these columns can, of course, be derived from the other two. The matrix may be illustrated pictorially (Fig. 8. This figure like the preceding ones is not drawn to scale).

The points representing lowest rate of substitution for each axis must (for efficient production) remain in production.

Points in the middle must go out or remain in, *i.e.*, the countries concerned must produce one good or more, according to the proportion of the different commodities required finally. Given this consumption pattern,[1] the efficient distribution of production is determined and will be such as to concentrate production on the points of lowest substitution rate subject to the condition that total supply must be enough to meet demand.

§ 26. *Efficient Production with Five Countries and Four Goods.* For the case of four commodities (giving three independent substitution rates) and five countries the cost matrix is illustrated in Fig. 9. Demand conditions, in conjunction with the five production-possibility functions, will as before determine which

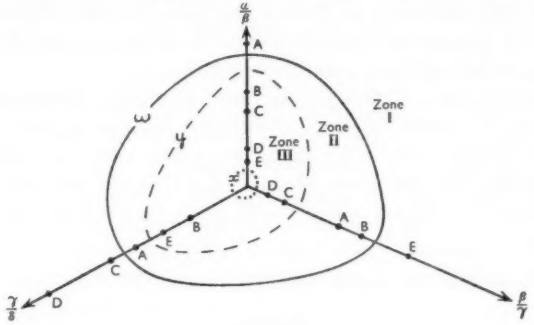

FIG. 9

industries should for efficient allocation of resources (*i.e.*, in the absence of any tariffs) be in production in each country. We indicate this as boundary w in the figure. Production in C of γ is shown as efficient in spite of the fact that C's substitution rate is higher than D's because D's maximum output has been assumed to be insufficient to meet demand. We could have drawn also a fourth axis $\left(\text{say } \frac{\delta}{a}\right)$ which would have shown B as an efficient producer of δ (*i.e.*, B would be outside the w boundary on this axis, though it need not necessarily be the furthest out of all the countries). However, as $\frac{\delta}{a}$ is implicit in the three ratios $\frac{a}{\beta}, \frac{\beta}{\gamma}$ and $\frac{\gamma}{\delta}$, it has been omitted from the picture.

[1] If one prefers, instead of taking relative quantities of consumer goods as given, one can think of relative prices of consumer goods as given. In the latter case the quantity of resources allocated may be indeterminate over a range. This corresponds to the situation where, for certain equilibrium quantities of consumer goods, prices may be indeterminate over a range. See Samuelson, *Foundations of Economic Analysis*, p. 74.

§ 27. *The Criterion of a Good Customs Union.* Tariffs create a boundary of division between producers and non-producers which in general differs from the boundary of efficient allocation. Thus a tariff high enough to protect every industry in every country might be indicated by the dividing line (x) in Fig. 9. Similarly, a tariff too low effectively to protect any industry would be indicated by any line on or outside (w). Finally, a tariff effectively protecting some but not all industries is indicated by the line (y).

The conclusions reached in Part I may now be applied.

If pre-Union tariffs were too low to protect any industry, Customs Unions have no effect (always ignoring internal distribution).

If tariffs protected all industries, any Customs Union brings gain; and the more complementary the uniting countries (where this can be defined) the greater the gain.

If tariffs were partially effective, Customs Unions between countries on opposite sides of the tariff boundary, but not over the boundary of efficient allocation, bring loss. Thus call the area outside the boundary w, Zone I. Call the area between w and y Zone II. Call the area inside boundary y Zone III.

Then :

Unions between points in Zone II and III bring loss.
" " " " " I " III have no effect.
" " " " " I " II bring gain.

The above applies to each commodity separately. In general, any given Union may bring both gains and losses in respect of the different commodities. The net gain or loss of any given Union can be determined only when the consumers' marginal substitution rates for the different consumer goods is given (these rates cannot in general be obtained from market prices).

In those cases where meaning can be given to the statement that one pair of countries is "more complementary" than another pair, the gain secured by a Union will be greater, or the loss incurred by it less, for the more complementary pair, always supposing that the two pairs considered refer to the same pair of zones.

Part III

§ 28. The analysis used in the present paper does not depend upon the assumption that goods must be consumed in a fixed proportion. We have to assume "given demand." We have spoken as though this meant actually that consumer goods have

to be consumed in a fixed ratio. This is not really so. All we need is to know *which alternative bundles* of consumer goods are valued equally by the consumer—*i.e.*, we need to know his indifference system. We have treated relative quantities of consumer goods as given in order not to have to deal simultaneously with variations in production and consumption. But the difficulty of treating such variations simultaneously is one of exposition rather than of analysis. Consumption activities can be treated in the same way as production activities. In fact, if one writes out a general matrix of the type used in Part I it can, from the purely formal point of view, be used to represent either the cost system or the indifference system, or (by including sufficient rows and columns) both. Thus one could fairly simply reinterpret the analysis of Part I so that it referred to a world of fixed output patterns with variable consumption patterns. One could also extend it so as to refer to a world where both production and consumption patterns may vary. This can be done with the aid of algebraic symbols; but the verbal exposition becomes rather heavy. To set out our analysis fully, with both consumption alternatives and production alternatives represented in their full variety, a more rigorous formulation than that used in the present paper has to be employed.

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MECHANISATION, UTILISATION AND SIZE OF PLANT

I

It is widely believed that mechanisation has been the most powerful force in the development of large-scale production in modern industry. Judging from everyday experience it seems obvious that large industrial plants are more mechanised than small ones. But when we scrutinise the terms "size" and "mechanisation" we obtain a proposition which, for all its apparent plausibility, is difficult to prove. The size of a plant is a compound of capital and labour which are in it combined as factors of production. Increased size may therefore be conceived in different ways: it is possible for a factory to expand in terms of either capital or labour, or both. To mechanise, on the other hand, means substituting machinery, that is to say fixed capital, for labour; the process of mechanisation involves employing fewer workers and investing more capital. Thus mechanisation will lead to larger plants in terms of capital investment, but not necessarily in terms of numbers of workers employed. If measured by numbers of workers, it is even possible that plants become smaller on account of the labour-replacing effects of mechanisation. This, however, is not what seems to happen in practice. Factories as a rule have grown both in terms of equipment and men. Hence we must assume that the labour-replacing effects of mechanisation are more than offset by concomitant labour-absorbing processes.

To what extent this is true can be established only on the basis of a comprehensive survey of a large number of industries, such as is provided by Census of Production data. The test might be made, for example, by comparing each industry's representative size of plant (measured by numbers employed) with its average horse-power per man, on the assumption that variations in the degree of mechanisation between industries are adequately measured by the horse-power ratio. If it is true that mechanisation—in spite of its labour-replacing effects—leads to larger plants, we would expect to find a positive correlation between size and horse-power: average horse-power per man would increase with size of plant. Since, for instance, typical steel plants are large and typical hat factories small, we would expect the average horse-power ratio to be high in the steel industry and low in the hat industry. That, within certain limitations, a trend of this nature

can be shown statistically, appears from an extensive investigation, based upon British and American Census data, by Professor Florence.[1] But the trend is not very clear. There are many deviations and exceptions from the rule. The resulting picture of modern industrial structure is in fact so complex as to defy any attempt at a simple generalisation on mechanisation and size. To what extent this is due to the labour-replacing (= size-decreasing) effects of mechanisation cannot be established by comparisons between industries. Even so, this inquiry puts it beyond doubt that the relation between mechanisation and size of plant is important and worth following up in detail.

We need, however, a different method if we want to utilise more detailed Census information on this problem. Instead of comparing average horse-power and representative plant size of whole industries, it would seem profitable to compare plants of different size *within* each industry. To do so recommends itself for yet another reason. If we glance over any Census table containing data on size, the most conspicuous feature is the fact that there is in almost every industry a wide distribution of plants of different sizes side by side. This makes it very difficult to determine what is an industry's representative size of plant. The same fact, on the other hand, makes a study of the finer size differentials within individual industries all the more inviting.

II

On trying out this method with data from the American Census of Manufactures, using the same hypothesis (that degree of mechanisation increases with size of plant), I obtained a number of unexpected results. Examining each industry separately, I found that the correlation between horse-power per man and size of plant is positive only in one particular group of industries. There was another somewhat larger group where the correlation was negative. This could perhaps be explained by the difference between labour-absorbing and labour-replacing effects of mechanisation, or so it seemed at the time. In a sense it seemed to fit the hypothesis. But the question arose: how could it be explained that some industries reacted to processes of mechanisation in a different way from others? Was there anything else in which these two groups differed? The answer would evidently depend on using in addition to horse-power and size a *third* criterion.

[1] P. Sargant Florence, *Investment, Location and Size of Plant*, Cambridge, 1948; "Patterns in Recent Social Research," *British Journal of Sociology*, September 1950.

This led to a lengthy inquiry in search of a further set of size-relevant correlations, proceeding by trial and error and using such Census criteria as " value added by manufacture," " wages paid " and so on. The results were in no way conclusive. All this was done at first for one Census year only, 1929; the trial-and-error search was later extended to 1939, 1919 and for some industries to 1909 and 1899. In the course of these inquiries it became increasingly clear that the original hypothesis could not be maintained.

Then, quite by chance, I discovered that there is in some industries a close correlation between certain long-term changes in size of plant and the horse-power ratio of a given year.[1] It appeared that frequently size of plant increases over long periods in spite of a relatively *low* horse-power ratio. Whatever this meant, it could not be explained as a consequence of mechanisation. In a preliminary way it was assumed that there is besides mechanisation another factor which controls size of plant. This other factor will henceforth briefly be called " utilisation." The concept implied, tentatively, that once an industry has reached a certain stage of advanced mechanisation, further economies of plant expansion are obtained not so much from technical progress as from special methods of plant organisation designed to secure fuller utilisation of existing capital equipment. This will be fully discussed later on; it is mentioned here only to indicate why it was necessary to construct a wider hypothesis, one that would guide the research so as to cover both technological and organisational factors controlling size of plant, viz., *mechanisation* as well as *utilisation*.

The revised hypothesis moves on a lower level of abstraction. It argues not, as the original hypothesis did, in terms of one broad generalisation. A more realistic though also more complicated argument develops if we explain the economies of scale as resulting from two independent sources, increased mechanisation and improved utilisation of equipment. I would still maintain that *all* economies of scale are caused by differences in the combination of capital with labour, and size of plant is defined, as before, by numbers employed.[2] But I would now argue that variations in the ratio of capital to labour do not reflect different degrees of

[1] This amounts to a multiple correlation of three factors: for instance, the distribution of workers in two Census years and of horse-power in one of the two years.

[2] This is, of course, arbitrary: we examine variations of the factor labour while the factor capital is kept constant; it makes no difference if it is done the other way round.

mechanisation only. They may also reflect different degrees of utilisation. It is possible that two plants are equally mechanised, and yet one employs fewer workers on given equipment than the other. If, for instance, factory A uses a single shift of workers and factory B a double shift, the ratio of capital (equipment) to labour would be (roughly) twice as high in A as in B, all other things being equal. Since capital equipment is more fully utilised in B than in A, economies of large-scale operation arise for B, because the overhead costs of equipment are spread over a larger number of workers.

We can see now why the old hypothesis is inadequate. To say that economies result solely from mechanisation implies the tacit assumption that variations in degree of capacity utilisation between plants of different size are of no importance. It implies that large plants are as a rule neither more nor less fully utilised than small ones; excess capacity, in other words, would be merely a random phenomenon, irrelevant to size of plant. Once this assumption is made explicit, and removed, utilisation emerges as an independent source of economies of scale.

The changed approach does not, therefore, imply that we merely amend the analysis of mechanisation by adding here and there a few qualifications. We do not ask, solely, whether mechanisation in its effect upon size is weakened or strengthened by improved utilisation. The point is, rather, that we have now two principles which are mutually exclusive and form a diametrical contrast. For mechanisation means primarily that fewer workers, and utilisation means that more workers, are employed. Or, to be more precise: mechanisation involves an increasing, and utilisation a decreasing ratio of capital to labour; capital increases more than labour as the result of one process, and labour more than capital as the result of the other. It will be seen that this contrast is decisive for the whole analysis of plant size.

What has been said so far describes, however, one part of my hypothesis only: the sources of economies. But there is another point which needs clarification. The possible effects of these economies on industrial size structure have so far been mentioned only in a preliminary way. As has been said before, we are not interested in the "representative" size of plant of an industry. Nor do we attempt to explain how it is possible at all that a plant should grow if there are at the outset an infinite number of plants of the smallest size in unrestricted competition. Instead, we will start off with the assumption that there already exist a certain number of plants of different size at any one time, producing the

same or nearly the same product. It implies that competition between these plants is limited. The aim is then to explain changes in the *relative frequency* of these plants. For instance, we want to explain how a trend towards large-scale production comes about.

The assumption that plants of different size exist from the start has not been chosen arbitrarily. It refers to a picture which readily unfolds from a historical study of almost every modern industry. Many plants which are very large to-day appear to have been already *relatively* large when they first came into existence. But there are also industries where for some time the trend is in the opposite direction, towards an increasing frequency of smaller plants; this, of course, has to be seen as starting from a position where plants have previously reached a larger size. The two types of development may be labelled " size-increasing " and " size-reducing " trends.

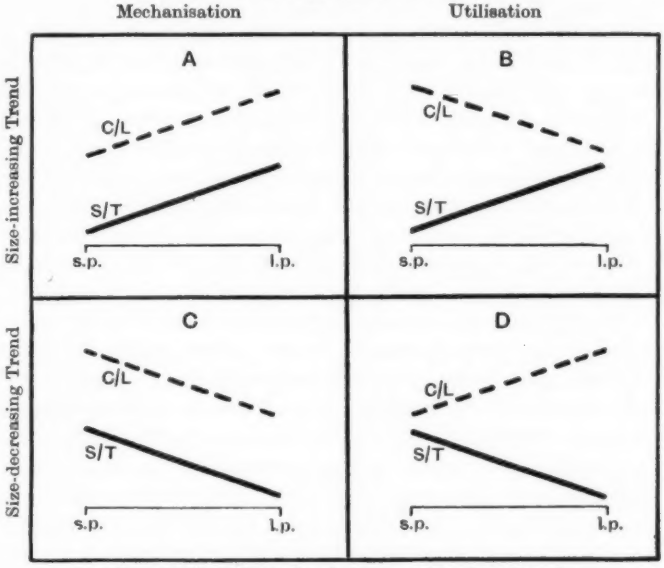
Although size-reducing trends are comparatively rare in modern industry, they should not be neglected. When analysed systematically they may throw some light on the question: Where is the limit of size expansion, and is it reached by different industries at different levels? It would seem that size-reduction is so different from size-expansion that forces other than mechanisation and utilisation are required to explain it. For it is usually taken for granted that the economies which result from variations in the ratio of capital to labour are economies of *large*-scale production. But theoretically, if size is measured by manpower employed, there is no reason why it could not be the other way round. It is conceivable that under certain conditions the smaller, not the larger, plants are more highly mechanised or utilised. By adopting this neutral attitude, we find ourselves in a position to explain both types of trends, size-increasing as well as size-reducing, uniformly by recourse to variations in the capital ratio.

The complexity of the problem calls for a schematically simplified presentation. The four cases which are theoretically possible are each shown by a diagram in Fig. 1. For each case two curves are plotted. Both are plotted against the same horizontal scale of size of plant; size, measured by numbers employed, rises in steps (corresponding in the subsequent statistical applications to those of the American Census of Manufactures) from left to right. One curve (a broken line) shows for each size-class the ratio of capital to labour (measured on the vertical scale by horse-power per worker). The other curve shows the size trend of the particular

industry; this is obtained by calculating for each size-class the percentages of all workers employed in plants of that size as two separate Censuses and calculating the ratio of the figure for the later year to that for the earlier year; the methods of doing this are described in more detail below.

Before going on to study the statistical results of the actual calculations it will be useful to consider briefly the four possible

Four Hypothetical Types of Industrial Structure



C/L = Ratio of Capital to Labour; S/T = Size Trend;
s.p. = Smallest Plants; l.p. = Largest Plants

FIG. 1

patterns which can theoretically emerge and the possible explanations of each of them. In each case it would seem reasonable to assume that the existence of a size trend towards certain sizes and away from other sizes can be regarded as evidence that manufacturers in that industry have believed that it would be likely to be more profitable to adopt those sizes. In short, changes through time are likely to be the result of profit differentials, or expected profit differentials, at a moment of time.

The four possible patterns may be described as follows:

(1) *Size-increasing Mechanisation* (*Type A*). Suppose we observe that the number of larger plants in an industry increases during a certain period, so that the size trend curve

rises from left to right: the largest may be assumed to be the most profitable plants as long as the size-increasing process is continuous up to the largest size. But the trend curve tells us nothing about the reason *why* the largest are the most profitable plants. The reason is provided by the other curve, which shows the capital–labour ratio in plants of different size. Let us suppose that we find that this curve also rises from left to right. We can then infer that the reason for the superior efficiency of the larger plants is that they are more mechanised than the smaller ones. For we have already seen that where the gain results from mechanisation, the ratio of capital to labour will be relatively high. Since in the present case the capital ratio curve is highest at the right (= largest plants) where relative growth, and by implication profits, are greatest, we must conclude that it is a case of mechanisation. The pattern which results is one where the two curves are parallel and positively inclined.

(2) *Size-increasing Utilisation* (*Type B*). Here we have a converse pattern of the two curves. It is obtained where the size trend curve is as before, while the capital ratio curve is reversed, from a positively to a negatively inclined position. In this case the implied advantage of the larger plants cannot be due to mechanisation. For it would make no sense to argue: the largest plants are most profitable because they are least mechanised. It does make sense, however, to argue that their capital equipment is most fully utilised. Improved utilisation means by definition that the advantage is obtained by employing more workers on a given equipment whereby the ratio of capital to labour is reduced. This converse pattern must therefore be interpreted in terms of utilisation.

(3) *Size-reducing Mechanisation* (*Type C*). Here we have again a parallel pattern, but this time the curves are negatively inclined. It is a situation where the smaller plants have increased relatively to the larger plants and may therefore be assumed to be more profitable. As to the capital ratio curve, we find the highest ratio where the profits are greatest; hence it is a case of mechanisation.

(4) *Size-reducing Utilisation* (*Type D*). Finally, there is another converse pattern. The size trend curve declines from left to right, indicating as before a size-reducing trend, but we find the lowest ratio of capital to labour where the profits can be assumed to be highest, at the left-hand side of the size scale. It is therefore a pattern of utilisation.

The upshot is that, with this method of presentation, mechanisation is always associated with a parallel and utilisation with a converse pattern. Thus the fundamental contrast from which we started is expressed in diametrically opposed patterns.

It may help to clarify the subsequent discussion if I point out a few practical implications for each of the four types.

(1) Type A corresponds to the old hypothesis. But it can now be seen that mechanisation leads to a size-increasing trend only under certain special conditions. By definition, a process of mechanisation means always that workers are replaced. The introduction of a new labour-saving device, such as an automatic rubber press in sheet-metal work, will, primarily, reduce the number of workers required for a given output. Thus far, the size of the plant, measured by workers employed, tends to become smaller. But the economies resulting from the innovation may be so considerable that in fact not one but many presses are installed in the same plant whereby the total number of workers in the plant increases. Thus the labour-replacing effect is more than offset by a concomitant labour-absorbing effect. There is an overall expansion of capital, output and labour, although the amount of labour per unit of capital (and per unit of output) has been reduced. It would seem probable, therefore, that mechanisation leads to size expansion only, or chiefly, when technological innovations and hence economies are exceptionally powerful. Intensive mechanisation may create labour-absorbing effects for another reason. The increased output may require more workers for purposes which are supplementary to the mechanised operation, such as packing, storage, despatch, maintenance, inspection and clerical work.

(2) A plant expanding through increased utilisation of equipment is best illustrated by a change from single to multiple work shifts. More labour is added to the same equipment. Utilisation in this sense, involving improved factory organisation rather than technical progress, has wider implications than are usually realised. It is the underlying principle of all methods of production which aim to secure greater continuity of operation. Probably the most important, though perhaps not always the most obvious application, is the change from job towards continuous line production. Any step in that direction means improved utilisation of productive time, space and equipment. For example, the mass production of motor-car wheels is frequently done by means of a continuous chain of consecutive operations on power presses whereby each press is used all the time. That this is essentially

a matter of utilisation, not mechanisation, is easily overlooked because it often happens that the continuity of operation is supported by mechanical devices. If line production is aided by an endless conveyor belt, a labour-saving process occurs simultaneously because the handling or the transport of components or work objects has become more mechanised. But line production is in principle a case of improved utilisation, however much it may in practice be supported by mechanisation. This is easily overlooked because conveyor belts are so much more conspicuous than changes in factory organisation. Many innovations in modern industry have been labelled as mechanisation which in fact represent essentially a progress in organisation.

(3) The process of mechanisation will entail smaller rather than larger plants whenever the secondary, labour-absorbing, effects are absent. The amount of labour then decreases not only relatively to capital and output, but also in absolute terms. This may happen if the economies consequent on mechanisation do not lead to sufficiently large increases of sales because the plant is tied to a local market. To visualise the process we must, of course, assume a large initial size of plant, which may have been reached, previously, by size-increasing mechanisation.

(4) A reduction in plant size resulting from improved utilisation of equipment would seem the least probable of the four cases. But it is theoretically possible to imagine a long-run decline in the demand for the products of a given industry, leading to more and more excess capacity throughout the industry, but so distributed that the smaller plants have relatively less than the larger ones, so that the degree of utilisation improves proportionally as size decreases and the rate of survival is higher among the smaller plants. The process would be in all respects the reverse of size-increasing utilisation.

It will naturally be objected against this method of analysis as a whole that neither mechanisation nor utilisation could occur as a " pure " case in real life. What happens in practice, it may be argued, is that both principles are in operation simultaneously and inseparably. But even so it is still possible, and indeed probable, that either one or the other will dominate during a certain period, so that on balance the ratio of capital to labour will rise or fall with size of plant. It would be useless as an analytical tool only if the ratio were constant with size; but the odds would seem heavily against a situation where the effect of mechanisation on the capital–labour ratio is precisely and automatically offset by simultaneous effects of utilisation. Only then would a straight

horizontal curve appear, a curve which would be meaningless in our context.

III

It has been made clear above that the limitations of the available Census data make it necessary to depend at two stages on assumptions or inference. Only as regard size of plant, measured in terms of numbers employed, do the data of the American Census of Manufactures fit conveniently into our analytical framework. Size of plant is measured in the Census by numbers of wage-earners, and each industry's size distribution is tabulated on a scale of 8 (or, since 1929, 9) size-classes, ranging from 1–5 wage-earners to 1001 or more wage-earners. But with regard to the ratio of capital to labour, and the relative profitabilities of different scales of operation, we have to use indirect measures which are bound to have their limitations.[1]

The Census supplies no data on capital equipment. As a substitute for the ratio of capital to labour we shall be forced to use rated horse-power capacity per man. To do so implies that variations in capital per worker between plants of different size, within any one industry, are reflected in corresponding variations of horse-power per man. This index is open to criticism, but chiefly so when an attempt is made to compare overall averages of whole industries. For example, the average horse-power per worker in the steel industry was 18·0 in 1929, and the corresponding figure for leather gloves 0·4. Steel-making is obviously more mechanised, and thus involves a much higher ratio of capital to labour than the manufacture of gloves. But we cannot say that the difference in degree of mechanisation is accurately expressed by the difference in the average horse-power per worker; for there is also a contrast in the weight of materials or products handled her worker, and since gloves are so much lighter than steel, the lower horse-power index of gloves may well reflect their lightness rather than a low level of mechanisation. But this objection need not deter us from our own investigation. For it must be clearly understood that we are not, primarily, comparing whole industries such as steel and gloves. We are comparing steel plants with steel plants within the industry, and glove factories with glove factories so that the disturbing factor, " weight of materials," is largely eliminated. For our purpose of intra-industry compari-

[1] With regard to the statistical part of this inquiry I am greatly indebted to Mr. Clive B. Williams for advice and criticism.

sons the ratio of horse-power per worker would seem a fairly good substitute for the ratio of capital to labour.[1]

The rates of growth or decline of different size classes are similarly being used to make plausible inferences about their relative profitability. The method may be illustrated by an example for a size-*increasing* trend. The percentage distribution of workers among the eight size-classes in the cigarette industry changed from 1919 to 1929 in favour of the larger classes. Of the industry's 105,000 workers in 1919, only 12% were in Class 7 (plants of 501–1,000 workers) and 15% in Class 8 (plants of 1,001 and more workers). The corresponding figures in 1929 are 22% and 32%, referring to a total of 139,000 cigarette workers. The relative rate of growth can be expressed for each of the eight size-classes by dividing the 1929 percentages by the 1919 percentages and multiplying by 100.

Size Trend of Cigar and Cigarette Manufacture

Size-class :		1.	2.	3.	4.	5.	6.	7.	8.
Percentage of all workers	in 1919	5·9	8·2	8·6	11·8	22·4	15·4	12·1	15·4
	in 1929	2·1	3·4	4·5	5·5	15·4	15·7	21·8	31·6
1929 Index (1919 = 100) . . .		36	42	52	46	69	101	180	206

These index numbers can be plotted against the size scale.[2] The steeper the curve, rising from left to right, the more intensive is the size-increasing trend (and, presumably, the more profitable are the larger plants). If, however, the curve declines instead of rising from left to right, it indicates a size-decreasing trend. The curves will be called rising and falling " size trends."

Schematically simplified and designed to bring out theoretical contrasts, the four possible patterns present ideal types. They cannot be expected to re-appear from the statistical curves in such clear-cut shapes as shown in Fig. 1. In practice different patterns may overlap and obliterate each other to varying extents. And there will be border-line cases.

Before describing the results of the statistical tests, a few technical points must be mentioned. The Census year 1929 had to be taken as a general basis because it is the only year in which horse-power data are given for each of the eight size-classes in

[1] The data for the horse-power ratio are obtained by combining Table 4 with Table 9 of the 1929 Census.

[2] See Fig. 6, p. 64, for the curves for cigar and cigarette manufacture.

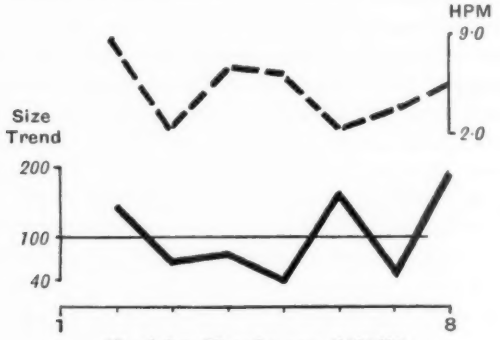
every industry.[1] The size trends were obtained as a rule by comparing 1929 with 1919. But for some industries the size structures of these two years were not comparable because of changes in Census classification. The years 1919, 1937 and 1939 had to be used in such cases. It did not seem to matter for our purposes whether developments from the past or into the future—always related to 1929—were taken as an index of size trends. Formal tests of statistical significance were carried out at the beginning of the inquiry, but later dispensed with. Instead, the nature of a pattern was simply determined by inspection, putting dubious cases aside. It soon became apparent that the most challenging problem was interpretation rather than formal significance: whenever a statistical pattern was not so articulated as to resemble clearly one of the hypothetical patterns, its possible meaning or lack of meaning could not in any case be established.

In what follows such examples have been selected for illustration as leave little doubt in respect of their resemblance to one or other of the hypothetical patterns. Each diagram is based on the standard scale of eight size-classes. The changes of the horse-power curve are measured on the scale on the right-hand side, and the size trends on the left. With the aid of these illustrations, the discussion of the results may be condensed into three points.

(1) *No Pattern.* All industries which employed in 1929 more than 5,000 workers were examined, to a total of 191 industries. Of these, 122 presented a picture of horse-power and size trend which did not agree with any one type of the hypothetical scheme. Nor did we find among them patterns of a shape not represented in the scheme. They are industries where either one of the two curves—or usually both—are zigzag lines which do not fall into any repeated pattern. This is illustrated by aluminium manufactures in Fig. 2. It appeared in some of these cases that the Census classification covers markedly heterogeneous products, and that that may, at least in part, account for the absence of a pattern. But lack of agreement between hypothesis and observation may also arise in another way: there are a few industries where both curves are fairly smooth, and yet no pattern of the hypothetical types emerges, because the curves are horizontal lines (see Fig. 3).

[1] It is possible, however, to test the association between horse-power and size of plant within an industry for years earlier than 1929 by an indirect method. Horse-power and size data are given separately for each industry in every American State. Thus we can correlate horse-power and average plant size State by State for separate industries. But the discussion of these rather complicated tests would go beyond the scope of this paper.

One is tempted here to argue that neither mechanisation nor utilisation varies appreciably between the different size-classes and that, consequently, there is size-stability instead of increasing or decreasing size trends. Such an interpretation cannot, however, be established without further research. Only a few such ex-



Aluminium Manufactures (1919/29)

FIG. 2

amples have been found; notable among them are cotton goods and foundries.

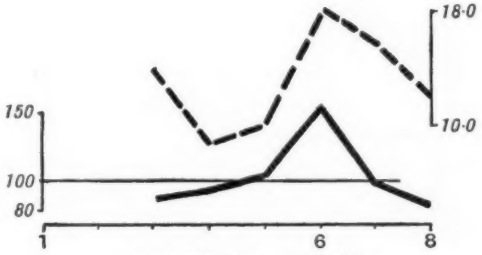
(2) *Composite Pattern.* There are numerous cases with a pattern in which two of the hypothetical types appear as distinctive elements. Thus the zigzag shape of a curve does not

Cotton Goods (1909/29)

FIG. 3

necessarily in itself mean lack of pattern. If we look at Fig. 4, both curves are irregular and show no resemblance with the straight lines of the hypothetical scheme in Fig. 1. And yet we can call this a "parallel" pattern. It consists of two parts. For size-class 1 to 6 we find the parallel pattern of size-increasing mechanisation (= Type A in Fig. 1) and for class 6 to 8 the parallel pattern of size-decreasing mechanisation (= Type C in Fig. 1). Thus, the pattern as a whole suggests mechanisation, not utilisation. The lack of smooth curves means, however, that mechanisa-

tion is here not throughout conditional on large-scale production, as measured by employment. Both the horse-power curve and the size-trend curve are highest in Class 6. Class 6 rather than the largest class seems to represent the " optimum " size, and at

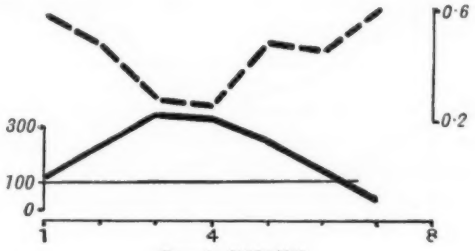


Chemical Products (1919/29)

FIG. 4

the same time the size of plant which affords the highest degree of mechanisation.

Such an interpretation will be still more plausible if we consider that there exists also a composite converse pattern (see Fig. 5). Here apparently we have a case of utilisation, although again each curve is irregular. One part of the pattern conforms to type B and the other to type D. The composite action of size-



Corsets (1909/29)

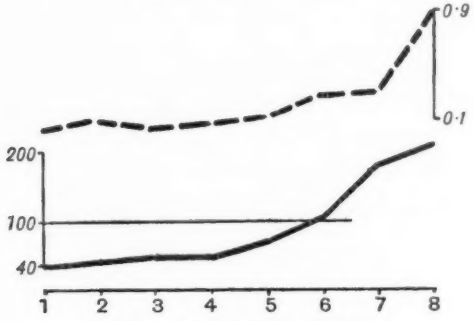
FIG. 5

increasing and size-decreasing utilisation produces a situation where neither the largest nor the smallest plants represent the optimum size. The optimum in the present example is class 3 or 4.

Further examples of the composite *parallel* pattern are the following industries: paper bags, electrical machinery, motor vehicles, petrol refining, rayon and allied products, rubber tyres,

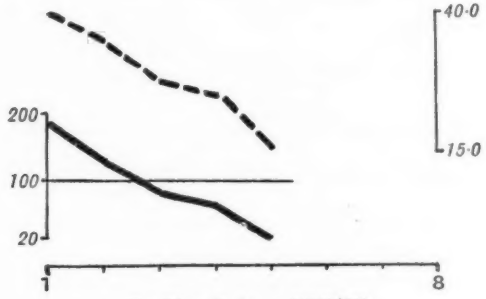
sugar refining (other than beet-sugar). Examples of the composite *converse* pattern are: boots (leather), buttons, baskets, concrete products, furnishing goods, millinery, flour-milling.

(3) *Complete Patterns.* Finally there are a number of industries with patterns that are complete and thus resemble closely



Cigars and Cigarettes (1919/29)
FIG. 6

the hypothetical types. It is true, however, that the criteria "composite" and "complete" are somewhat arbitrary. Suppose, for example, the optimum size of plant in chemical products were Class 7 instead of 6. Strictly speaking it would still be a composite pattern. But the size-increasing part of the pattern

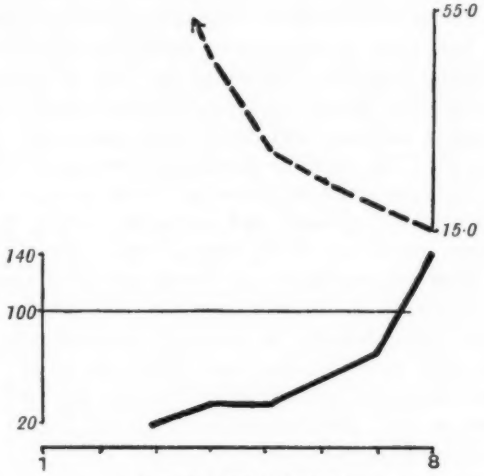


Ice Manufactures (1919/29)
FIG. 7

would be so much more prominent than the size-decreasing part that in fact the whole pattern would come very near to a "complete" pattern of Type A. There are many border-line cases in that sense. But this, of course, does not affect the fundamental nature of a pattern: whether it is parallel or converse.

Comparing our observations of complete patterns with the

scheme, it was found that one of the four types, size-decreasing utilisation (type D), does not occur. So we are left with size-increasing mechanisation (type A; see Fig. 6), size-increasing utilisation (type B; see Fig. 7) and size-decreasing mechanisation



Iron and Steel (1909/29)

FIG. 8

(type C; Fig. 8). In addition to the examples shown in the diagrams, similarly complete patterns of the three types were discovered among the following industries:

Type A: boot and shoe cut stock, paper boxes, beverages, cash-registers, coke, corn-syrup, engraving steel, gas fixtures and lamps, glass, glass products, scientific instruments, machine-tool accessories, optical instruments, pocket-books, printing newspapers, washing-machines.

Type B: agricultural implements, clay products, electric railroad cars repair shops, carpets, children's carriages, electroplating, felt goods, files, cloth gloves, jewellery, motor-vehicle bodies, leather tanning, lumber, cotton-seed oil, planing mills, paper, peanuts, copper smelting, stereotyping, woollen goods.

Type C: awnings, wooden boxes, condensed milk, cement, women's clothing, coffee roasting, prepared feeds, fertilisers, forgings, grease and tallow, meat-packing, pencils, beet-sugar, chocolate.

IV

It remains to survey the results as a whole. The picture which has emerged in the course of this study is different in a number of points from the picture which we expected to find. We found, first of all, that there are in many industries surprisingly consistent long-term developments, consistent inasmuch as the trend gravitates towards a particular size-class of plant. This is most frequently the largest size-class,[1] although clearly articulated trends towards medium and small-scale production have also been observed. The result is unexpected because when we look at any one industry's size structure as it exists in a given year, we merely see a widely diffused and confusing variety of plants of different size : there is no truly representative size of plant.

But if there are consistent size trends one must presume that there are forces which assert themselves consistently over long periods and thus determine an industry's optimum size of plant. We found some evidence that such forces do exist. The size-trend curves form in these industries recurrent patterns with their horse-power curves ; from this we have inferred that variations in the ratio of capital to labour between plants of different size create profit differentials, which in turn determine the size trend.

Variations in the capital–labour ratio, however, are only the immediate cause of the size trends. The question arose : What ultimately determines these variations themselves ? At first it seemed plausible to answer the question by reference to variations in the degree of mechanisation as the ultimate determinant of the capital–labour ratio (and hence of the size trends). Mechanisation is a form of technical progress, and technical progress is generally believed to be the sole dynamic factor in this field. Yet on closer analysis we found that a single factor like mechanisation could not account for the observed contrast between parallel and converse patterns of size-trend and horse-power curves. Thus we came to distinguish between mechanisation and utilisation, or to put it more generally, between technological and organisational changes in methods of production.

It became evident, moreover, that mechanisation can lead to size increase only when it involves technological innovations that are unusually drastic and rapid. They must be so profitable as to

[1] It should, however, be pointed out that the largest size-class is defined by employment of 1,001 or more workers ; this is not a very large size by modern standards, and a trend towards the largest size-class does not necessarily imply a trend towards larger scale inside that class.

call for their multiplication in the same plant, thus producing labour-absorbing effects.

If this has not been seen clearly in past research, utilisation as a separate force of expansion seems to have been overlooked altogether. It is probably at least as important as technical progress, even if its role in industrial expansion may be on the face of it be less conspicuous.[1]

There is one further point in which the present study deviates from familiar notions. Looking at the observations as a whole, it will be recalled that out of a total of 191 industries only about one-third had a recognisable pattern of some kind. Obviously, there can be no pattern if there is no size trend. The most general division is, therefore, a division between industries without size trends and industries with size trends. What, then, is the nature of the difference between these two groups? How, in other words, is it to be explained that there are any size trends (and patterns) at all? May I first remove a factor which plays only a minor role in this matter? It became clear that the difference between the two groups is only to a small extent a difference between heterogeneous and homogeneous Census classifications.[2] A more important factor is this: industrial change is spread unevenly over the various industries which make up a given economy at a particular time. There is normally a juxtaposition of what may loosely be called "new" and "old" industries; we find, at a given time, a comparatively small group of expanding or "new" industries where technological and organisational changes are so powerful and lasting that consistent size trends evolve. At the same time, there is a larger group of "older" industries which are in a state of comparative stability without persistent and far-reaching changes in their methods of production, and here we have no size trends. This is a broad generalisation, to which, of course, there are exceptions: a few extreme cases of unusually sudden expansion were observed which did *not* show

[1] Useful information supplementary to the Census may be found in the *Bulletins* of the *U.S. Department of Labor*, notably in Nos. 412, 474, 585, 660, 662, 702, 706, 712, 719, 720 A and B, 726, 729, 737, 791, 800, 806, 807, 819, 854, 868, 917. See also H. Jerome, *Mechanization in Industry*, New York, 1934, and S. Giedion, *Mechanization Takes Command*, New York, 1948. Organisational innovations such as different types of line production, organised teamwork and multiple shifts are occasionally mentioned in the literature, but they are not seen as something different from technological mechanisation.

[2] Besides, a size trend does not require complete homogeneity in terms of products. It does not matter that an industry comprises different products (like glass products) as long as they all have at least one major process (like glass smelting) in common.

any trace of a consistent size trend (for example, aluminum manufactures).

Industrial structure, to put it dogmatically, must be seen as a kind of age structure, viewed in the perspective of different ages of development existing side by side. This not only helps one to understand why there are two groups of industries, with and without size trends; the same principle may be applied to the main subdivision of the size-trend groups, the division between mechanising and utilising industries. Indeed, if it were not for the juxtaposition of successive ages, it would be difficult to understand why mechanisation emerges, separately from utilisation, as a clearly dominating principle in certain groups of industries.[1]

A clue to the interpretation of this is provided by the fact that among the mechanising industries are the outstanding examples of new industries: motor vehicles, rayon, electrical machinery, chemical products, rubber tyres and printing newspapers. Apparently the parallel pattern of mechanisation predominates during the earlier stages of a process of expansion; major technological innovations with labour-absorbing effects are carried out; both capital and labour expand, but capital at a faster rate than labour. Then there comes a point when utilisation takes over as the dominant principle controlling expansion, because it is no longer possible or profitable to carry through radical technological innovations. This stage is represented by the converse pattern group of industries; both capital and labour may still grow in the expanding plants, but it is now labour which increases at the faster rate; since older methods of production are not as quickly discarded as new ones introduced, it becomes increasingly important to utilise more efficiently the bulk of equipment which has accumulated during the previous phase. Thus, improved methods of factory organisation rather than technical progress become the controlling factor of size of plant. This does, however, not imply technological stagnation. It means that technical innovations are dictated by, and adjusted to, organisational progress.

There can be no question that further research is required to find out exactly how these dynamic forces determining plant size operate in specific situations. But this problem cannot be answered from Census data. It calls for intensive studies comparing single

[1] A number of statistical tests to determine whether the members of each group have anything else in common besides utilisation or mechanisation have failed to produce conclusive results and need not here be described.

factories and industries selected on the basis of different stages of development, of opposed size trends and contrasting patterns. It is my belief that the present inquiry provides the framework without which the selection of relevant cases would be impossible.

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INTERDEPENDENCE OF CONSUMER PREFERENCES IN THE THEORY OF INCOME REDISTRIBUTION

I—Introduction

In a recent article [1] Mr. H. G. Johnson has investigated the effects on total consumption expenditure of a redistribution in income taking into account interdependence of consumers' preferences in addition to the usual consideration of differences in the marginal propensities to consume of the income groups affected. The problem is basically as follows. Given the relation between the marginal propensities to consume of the relevant income groups, one can deduce immediately the total *income*-effect of the redistribution. To adjust this for the *interdependence* effect some assumption has to be made about the manner in which a change in the consumption of any income group causes the rest of the economy to change its consumption as a result solely of interdependence relationships.

The interdependence effect is analysed by Mr. Johnson with the aid of the concepts of an " emulative society " and a " competitive society." A " competitive society " is defined as one in which " the individual's influence on everyone else's consumption varies inversely with his position in the income scale; this might be the case (loosely speaking) in a society in which everyone was concerned with keeping ahead of those further down the income scale than himself " (p. 141). The definition of an " emulative society " is the converse of the definition of a " competitive society." In other words, in a competitive society the amount by which the rest of the economy changes its consumption as a result of a change in the consumption of any individual is the greater the lower that individual comes in the income scale. Now it should be noted that this does not necessarily correspond, even " loosely speaking," to a society in which individuals are concerned only with keeping ahead of those below them without being " emulative " in the sense of trying to keep up with those above them. In fact, it is possible to arrive at Johnson's " competitive society " even where individuals are solely " emulative." For example, if individuals were subject only to emulation, and then with respect only to other individuals having approximately

[1] " The Effects of Income-Redistribution on Aggregate Consumption with Interdependence of Consumers' Preferences," *Economica*, May 1952.

similar incomes, then if the emulation reactions were much stronger in lower-income groups than in higher-income groups it would be possible for the society to exhibit the characteristics of a "competitive society" as defined by Johnson (except that the effect of the lowest individual would be zero). *A fortiori*, it is possible to show that if individuals are allowed to act in such a manner as to try to keep up with those above them as well as keep ahead of those below them, a variety of conditions on the relative strengths of the two reactions as one proceeds up the income scale would permit the society to appear to be "competitive." The same result applies, *mutatis mutandis*, to his definition of an "emulative society."

Thus these concepts as defined by Mr. Johnson tell one nothing about how individuals behave as each definition can be satisfied by a wide variety of assumptions about the behaviour of individuals, including even the case where a "competitive society" is satisfied by a situation in which everybody is "emulative" in the sense defined above. Thus Mr. Johnson's various final solutions to the redistribution problem are only solutions in terms of varying assumptions about the total interdependence-effect and its size relative to the income effect, and are not solutions in terms of assumptions about individual behaviour, which is really the type of solution one requires. Mr. Johnson's solutions thus constitute a strange type of taxonomy. For varying assumptions about the competitiveness or emulativeness of society corresponding varying total results of income redistributions are obtained. But in this particular problem useful taxonomy would constitute a set of relationships between total effects of income redistribution and different individual behaviour assumptions. Mr. Johnson's taxonomy does not even permit this.

In this present article an attempt is made to show how, on the basis of certain assumptions about individual interdependence behaviour, one can deduce the interdependence behaviour of society as a whole, so that the total effects of income redistribution can be related both to marginal propensities to consume and to a variety of desired interdependence behaviour assumptions. This method of approach is what Mr. Johnson calles the "psychological" method as distinct from his method which he calls the "sociological" method. The former is rejected by Mr. Johnson on the grounds that "it would be no easy matter to infer the relative influences on total consumption of each individual's consumption." Of the "sociological" method Mr. Johnson writes that "this eliminates a great deal of difficulty, at the expense of

preventing us from interpreting the rankings, *except in a very loose way*, in terms of the social psychology of the community" (pp. 140–1; italics inserted by the present writers). As shown above the interpretation permitted is too loose to be of any utility.

Furthermore, the elimination of "a great deal of difficulty" by the "sociological" method, far from being a merit, constitutes in fact its greatest weakness. For by beginning the analysis of the problem half-way through—*i.e.*, starting with a few possible patterns of the interdependence behaviour of society as a whole—it conceals the innumerable difficulties that are involved in choosing a set of assumptions about *individual* interdependence behaviour which can be used to construct a pattern of *social* behaviour. If interdependence effects are to be incorporated in the theory of income redistribution in a useful and meaningful manner the important question is surely whether enough reasonable assumptions about individual behaviour are possible for hypotheses of society's interdependence behaviour to be deduced.

Attempts to by-pass this problem, by hoping that it is the interdependence behaviour of society as a whole which can be assumed, will serve little purpose.

In this paper, a method of deducing society's behaviour on the basis of certain postulates of individual's interdependence behaviour is presented in order to provide a means by which one can reveal and emphasise the large number of assumptions required at every stage in the interdependence problem. Also it is shown how rapidly the number increases if only one or two essential refinements are to be added. The conclusions to which this leads are (*a*) that under a set of fairly reasonable assumptions about interdependence of consumer preferences the resulting pattern of effect of income redistribution is likely to be very little different from the effect when interdependence is ignored, and (*b*) that the number of postulates required to arrive at any conclusion is so large anyway that until a vast increase in our knowledge of individual interdependence behaviour is obtained, speculation about the total effects can only be deceptive. It is hoped that use of the "psychological" method not only enables one to demonstrate these conclusions, but also provides some suggestions as to the type of questions about individuals' interdependence behaviour which need answering.

II—Postulates of Individuals' Interdependence Behaviour

As a possible method of approach to this problem, we propose to start with certain postulates of interdependence behaviour of social groups, and proceed to analyse the ultimate results that these will give. To make the system manageable to begin with, we will make three simplifying assumptions :

1. All prices and interest rates are constant, so that aggregate consumption ultimately depends only on aggregate income and its distribution.

2. Redistribution of income does not go so far as to alter the relative positions of income groups in the income scale.

(These first two assumptions will be readily recognised as assumptions 1 and 3 in Mr. Johnson's article.[1])

3. If, through redistribution of income or otherwise, there is a change in consumption, this has no repercussions on income levels of the various groups. (It is proposed to investigate the difficulties involved in relaxing this last, highly artificial, assumption in Section V.)

With this framework to our system we then suggest the following postulates of consumers' behaviour :

4. The consumption C_i of an average individual of the ith income group in any time-period is affected only by the average income of the group, and by the consumptions C_{i-1}, C_{i+1} of similar individuals in the two immediately neighbouring groups, in the preceding time period. Obvious modifications are made for the two end income groups. Also, this assumption in itself can be taken as determining for us the size of the income groups.

5. The effect of a change x in C_{i-1} alone on C_i in the next time-period is the same for all i and given by ax (a assumed $\geqslant 0$). This can be identified with the competitive element in society, *i.e.*, the extent to which the consumption of any group is influenced by changes in the consumption of those below them in the income scale.

6. The effect of a change y in C_{i+1} alone on C_i in the next time-period is the same for all i and is by (b assumed $\geqslant 0$). This can be identified with the emulative element in society, *i.e.*, the extent to which the consumption of any

[1] *Op. cit.*, pp. 131–2.

group is influenced by changes in the consumption of those above them in the income scale.

7. When changes of the same sign occur in the average consumption of the two groups on either side of any particular group i, *e.g.*, of amount x in C_{i-1} and y in C_{i+1}, that group will react, in the next time-period, by the larger of its separate reactions ax and by. This implies that, if x and y are negative, the reaction will be—min. ($|ax|$, $|by|$), *i.e.*, there will as a rule be less tendency to copy the behaviour of neighbouring groups if they are both decreasing consumption than if they are increasing.

8. When changes of opposite sign occur in the average consumption of groups on either side of any particular group i, *e.g.*, of amount x in C_{i-1} and $-y$ in C_{i+1}, that group will react by an amount $ax - by$.

In considering these postulates, it will be seen that only in postulate 7 do we differ completely from Mr. Johnson's approach. Thus postulates 4, 5 and 6 would give, with his method, a consumption matrix of the form :

$$\begin{pmatrix} 1 & -b & 0 & . & . & 0 \\ -a & 1 & -b & . & . & 0 \\ . & . & . & . & . & . \\ 0 & 0 & . & . & -a & 1 \end{pmatrix}$$

e.g., compare the 3×3 matrix he suggests on p. 146, which has the form :

$$\begin{pmatrix} 1 & -a & 0 \\ -b & 1 & -c \\ 0 & -d & 1 \end{pmatrix}$$

It is not our intention to claim that our postulates are the most realistic—in such a discussion as this they must necessarily be very subjective and open to criticism. Since some such assumptions must be made before anything definite can be said about the ultimate effects of interdependence behaviour of individuals, we believe these to be as simple as any in their implications, and yet even here many difficulties arise in the attempt to reach definite conclusions.

Our postulate 7 is precisely a very subjective proposition of the kind mentioned. The competitive and emulative reactions of any individual in any time-period are not assumed to be additive as they would in Mr. Johnson's system, where, with his infinitesimals approach, the reaction in the next time-period would be $ax + by$. Any increase in consumption C_i is assumed to

cover both an individual's competitive and emulative desires approximately in such a situation, so that the greater of the two possible reactions ax, by is alone called forth.

It will be remarked that this postulate implies inconsistency of behaviour with respect to time, thus a change x in C_{i-1} in one time-period and a change y in C_{i+1} in a later period will lead to different initial and ultimate effects from similar changes in the same time-period. This is one reason for the introduction of time-periods into our analysis, as distinct from Mr. Johnson's, which neglects the possibility of important differences of effects if such stimuli occur in different time-periods. We envisage the spreading of the interdependence effect of initial consumption changes through the whole set of income groups to be a comparatively slow process; time-periods, in fact, being so long that the psychological possibility of killing two birds with one stone by a reaction of the form *max.* (ax, by) has to be relinquished when the impulses x, y occur in different time-periods.

Finally, with this time-period analysis it is clear that assumption 3 is much more debatable than with Mr. Johnson's analysis. But this may be claimed as advantageous if it enables us later to expose further difficulties which the retention of this assumption in either analysis would conceal.

III—Model of Society's Interdependence Behaviour

To begin with, let us assume r income groups with n people in each. Then on our set of postulates a unit change in C_1 will lead to the following series of increases:

1st time-period. $C_i = 1$, all other $C_j = 0$

2nd time-period. $C_{i-1} = b$, $C_{i+1} = a$, all other $C_j = 0$ (by postulates 5, 6)

3rd time-period. $C_{i-2} = b^2$, $C_i = ab$, $C_{i+2} = a^2$, all other $C_j = 0$ (by postulates 5, 6, 7)

leading to ultimate increases:

$$C_1 = \frac{b^{i-1}}{1-ab} \cdot \cdot \cdot \quad C_i = \frac{1}{1-ab} \cdot \cdot \cdot \quad C_r = \frac{a^{r-i}}{1-ab}$$

provided that the stability condition $ab < 1$ holds.

Thus the total effect D_i of a unit change in C_i on the total unit consumption of the community, where D_i is comparable to Mr. Johnson's on p. 138, is given by:

$$D_i = n\,\frac{aA_{r-i} + B_i}{1-ab}$$

where $$A_s = \frac{1-a^s}{1-a},\ B_s = \frac{1-b^s}{1-b}$$

Then at once :

(i) D_1 is the maximum D_i, and D_i decreases as i increases, if $a^{r-1} > b$. This would correspond to Mr. Johnson's case of a competitive society.

(ii) D_n is the maximum D_i, and D_i increases as i increases, if $b^{r-1} > a$. This would correspond to Mr. Johnson's emulative society.

(iii) Otherwise the maximum D_i, D_m, say, is given by :

$$b^{m-1} > a^{r+1-m} > ab^m$$

in which case D_i increases as i increases, $i < m$, and decreases as i increases, $i > m$, *i.e.*, D_m forms a single peak.

$$D_r \gtrless D_1 \text{ according as } b \gtrless a.$$

Unless a, b are widely different in value or one is zero, m will tend to lie towards the middle of the income range. If $a = b$, $m = \frac{r+1}{2}$ for r odd and $= \frac{r}{2}$ and $\frac{r}{2} + 1$ for n even.

Relaxing the assumption of equal numbers in groups, and assuming numbers n_i in the ith income group, $i = 1 \ldots n$, then D_i is replaced by :

$$D_i' = \sum_{j=1}^{i} \frac{n_j b^{i-j}}{1-ab} + \sum_{j=i+1}^{r} \frac{n_j a^{j-i}}{1-ab}$$

If, then, the n_i decreases as i increases, the maximum D_i' will occur at a value m', $m' \leqslant m$ where m is where the maximum value would occur with similar behaviour and equal income groups; if n_i increases, the reverse effect holds, while if n_i is non-monotonic with respect to i, the position of m' relative to m will be dictated by the relative sizes of the differences between a and b, and between the various n_i's. But what knowledge are we likely to have about the order of sizes of the n_i?

As stated previously, income groups have been chosen in such a way that an individual in any group only reacts to changes in consumption by individuals in groups next to his own group and not to changes in consumption by individuals in income groups farther removed. We must now consider what pattern of income groups this procedure will lead to with respect to the problem of how the population density of group i changes as i increases. Ignoring for the moment intermediate cases, let us consider two possible cases : (i) the resulting income groups are

equal when measured in terms of income range; (ii) the resulting income groups are equal when measured in terms of population density. To what assumptions about individual behaviour would these cases correspond? Clearly case (i) would correspond to the assumption that the range over the income scale within which the consumption of other individuals affects the consumption of a given individual is equal for all individuals *when the range is measured in units of income*, and case (ii) means the same thing but *with the range measured in numbers of individuals*. Now if individuals were consistent in the sense that the ranges were equal for all individuals in terms of one or other of these units of measurement, then case (ii) would represent the limiting case where population density was equal for all groups, and any intermediate cases between case (ii) and case (i) would result in the population density of group i falling as i increases, simply because for any given *income* range the population density will be lower the higher is this income range situated in the total income scale. But although consistency would provide the two limits of the extent to which income density of group i declines as i increases, the possibility of individuals being subject to a combination of both of the possible measures means that some knowledge of the nature of the combination would be required in order to specify exactly where within the two limits the correct pattern existed.

Worse, it is quite probable that individuals are not consistent with respect to one measure or the other or with respect to either, in which case even the limits vanish. Thus without considerable knowledge about this aspect of interdependence behaviour nothing can be said about the way in which the population density of the groups will vary over the income range. It will, of course, be obvious that if groups were to be defined in such a way that the population density followed some regular chosen pattern, then nothing could be said about the range of interdependence effect measured in terms of groups!

IV—Total Effects of Income Redistribution

It has so far been supposed that the change in consumption expenditure C_i has occurred autonomously. Mr. Johnson's article, however, is mainly concerned with redistribution of income affecting the consumption of classes losing or gaining income, and the set of interdependence effects that this creates. It may well be argued that this kind of consumption change is not the sort most likely to lead to pronounced income effects, since the total change in consumption by any class undergoing

a small change in income is quite likely to be unnoticed by any except the recipients. On the other hand, certain quite large and noticeable changes in consumption, such as the purchase of a new commodity, *e.g.*, a wireless or television set, or motor-car, or the redecoration of a house, etc., may well occur and be paid for by a change in the group's propensity to consume, without any corresponding change in income of the group behaving in this manner, and it is precisely the slow filtering through of effects of these changes in expenditure to other income groups that is likely to be the most obvious form of interdependence behaviour of a community. (The slowness of these effects, and the necessity to consider their action over a considerable period of time, may be put down to the inertia of community tastes and reactions to changes in fashion.)

However, leaving these considerations to one side, the ultimate effects of redistribution of income from one group to another can easily be analysed. For let c_i be the marginal propensity to consume with respect to income of the ith class; (these correspond to the F_i or F_{iy} in Mr. Johnson's paper, see, *e.g.*, pp. 133, 138). A change in average income ΔY of the ith group, then, will lead to a total increase in consumption of:

$$c_i D_i \Delta Y$$

It can reasonably be assumed that:

$$c_1 > c_2 \ . \ . \ . > c_n$$

Then with equal group numbers:

(i) If $a^{r-1} > b$, then c_1 is the maximum $c_i D_i$.

(ii) $c_r D_r$ is only the maximum $c_i D_i$ if $c_r\, b^{r-1} > c_1 a$.

(iii) Otherwise a necessary condition for $c_M D_M$ to be the maximum $c_i D_i$ is—

$$(c_M - c_{M+1}) D_M > c_{M+1}(b^M - a^{r-M})$$

$$c_{M-1}(b^{M-1} - a^{r+1-M}) > (c_{M-1} - c_M) D_M$$

Note, however, that there may be more than one value of M satisfying these inequalities if the c_i do not fall off regularly, but if M' is the highest value of M, $c_i D_i$ decreases as i increases for $i > M'$.

(iv) $M \leqslant m$, where D_m is the maximum D_i.

(v) $c_r D_r$ is the minimum $c_i D_i$ if $c_r B_r < c_i\, An$, and this is necessarily true if $b \leqslant a$.

(vi) If a, b are small compared with min. $(c_i - c_{i+1})$, $c_1 D_1 > c_2 D_2 \ . \ . \ . > c_r D_r$, *i.e.*, the interdependence effect does not alter the order of magnitudes of the income effect.

If max. $(c_i - c_{i+1})$ is small compared with c_r. min. $\left(1 - \frac{D_{m-1}}{D_m}, 1 - \frac{D_{m+1}}{D_m}\right)$, $c_m D_m$ is the maximum $c_i D_i$, and the income effect of different c_i's does not affect the order of magnitudes of the interdependence effect.

In general, we wish to consider the effect of ΔY taken from group j and given to group i. Still assuming equal numbers in income groups, the total effect of this on consumption will be :

$$(c_i D_i - c_j D_j)\,\Delta Y, \text{ by postulate 8.}$$

Hence if the purpose of redistribution of income is to increase consumption, the best result for a given ΔY will be if $c_i D_i$ is the maximum and $c_j D_j$ the minimum.

Further to our argument at the beginning of this section, we may remark that income given to the lowest income group of all is the most likely to be spent on necessities, and such expenditure is the least likely to have an interdependence effect on others. Finally, postulate 7 suggests that a smaller negative $-c_j D_j$ effect might be obtained by taking from more than one group, provided the $c_i D_i$ for the groups chosen are not too different and that at any rate more is taken from the minimum $c_i D_i$ group.

If, however, income groups are not assumed of the same size, a further complication appears. For taking an amount ΔY from each individual in the jth class gives a total amount of income $n_j \Delta Y$ to be distributed amongst the i members of the ith class, giving an income change for them of $\frac{n_i}{n_j}\Delta Y$, with total effect on consumption :

$$\frac{1}{n_j}(n_i c_i D_i - n_j c_j D_j)\Delta Y$$

V—Further Repercussions of Income Redistribution

So far we have held rigidly to our assumption 3, namely that there are no repercussions of increased consumption on aggregate income, and hence on the income going to the various income groups. The artificiality of this assumption coupled with the time-period analysis of interdependent consumers' behaviour is sufficiently obvious, and we now propose to indicate the many apparently insoluble complications that arise if the attempt is made to treat this aspect of the problem more realistically.[1]

[1] We wish to emphasise our debt to Mr. Johnson in indicating to us the importance of these considerations.

Let us assume, then, that in a given time-period there occurs an increase ΔC in consumption, unaccompanied by any other change in the determinants of the system. It is irrelevant to our present discussion where this may be assumed to be due to an autonomous change in expenditure by one or more income classes, or to a redistribution of income ΔY leading to an immediate first-round effect on aggregate consumption.

Since it is also irrelevant here whether or not the groups are of equal population densities, for simplicity's sake we will assume that they are and that income is redistributed from the jth to the $i(<j)$th class giving $\Delta C = n(c_i - c_j)\Delta Y > 0$. But this will immediately increase aggregate income during that time-period, and this in itself will have an effect on the consumption of any income group during the following time-periods. This would immediately raise the following important complications :

(1) So far axioms of behaviour have only been assumed for the consumption of income groups in any given time-period when its income remained unchanged, but the consumption of other groups during the previous time-period had altered. It is obvious that the reaction may well be completely different if in the previous time-period the group under consideration itself underwent a change, say for our present purpose an increase, in income, so that anyhow its consumption in the present time-period would have gone up. It follows that a fresh set of postulates of behaviour for these situations would be needed.

(2) Information would further be required as to how any specific increase in income is distributed among the various groups. This is the familiar but intractable problem in any economic theory concerned with changes in aggregate income level. In an essay in a forthcoming symposium on the subject of redistribution which we have been privileged to see, Mr. Johnson assumes that we have this information and that of an increase ΔY in aggregate income amounts $w_i\Delta Y$ go the ith individual, where $\sum_i w_i \leqslant 1$. Adapting this terminology, we shall suppose that amounts $w_i\Delta Y$ go the ith class; thus individuals in that class receive amounts :

$$\frac{w_i}{n_i}\Delta Y$$

and increase consumption by $\frac{c_i w_i}{n_i}\Delta Y$, with total increase of consumption by the group of $c_i w_i \Delta Y$.

(3) In addition to this information, normally required in income redistribution problems, it will also be necessary to have information about the rates at which increments of aggregate income are distributed to the various classes. These are obviously likely to vary considerably from class to class, and this is a matter of immediate importance to the interdependence problem. With our approach, based on a time-period analysis, the importance of such considerations is clear from the start. Complications (1) and (3) are not fundamental to Mr. Johnson's approach only because his use of infinitesimal changes has already assumed away difficulties of this kind. For example, it assumes that there is no complication of the type (1) above. In contrast, as a parallel to our postulate 7, we could consider here the effects of the following possible behaviour postulates :

Postulate 9 : if in any given time-period the income Y_i of an average individual in the ith group increases by an amount z, while C_{i-1}, C_{i+1}, change by amounts x, y, then the reaction of such an average individual will be :

$$\max. (ax, by, cz)$$

Such a postulate would imply that in any redistribution of income problem, the interdependence effects, while always latent in the economy, would be partially or perhaps even wholly swamped by the effects due to increasing personal income. Alternative possibilities remain endless. Nevertheless, before such assumptions can be used in reaching any conclusions of ultimate effects, knowledge on (2) and (3) is indispensable, and only by assuming postulate 9, that the w_i's mentioned above are known, and that all groups receive their income increments immediately, could our system be pushed to an ultimate conclusion.

A further possible danger of the linear-equations approach is that such considerations become irrelevant, *i.e.*, the final result of any initial changes is independent of the time lags involved. To take two extreme cases, if we assume simultaneous adjustment to the interdependence effect (easily extended to groups with equal numbers) and then distribution of the accumulated extra income to everyone simultaneously to start a new round of effects, the system will follow the matrix equation

$$x(t) = (I - A)^{-1}Cz(t)$$

where $x(t)$, $z(t)$ are column vectors of elements $x_i(t)$, $z_i(t)$, the

changes in consumption and income respectively of the ith individual (group) during the tth time-period, C is the $r \times r$ diagonal matrix $(\delta_{ij}C_i)$, $\delta_{ij} = 0$ for $i \neq j$, and A the $r \times r$ matrix of reaction coefficients a_{ij} of the ith individual (group) to changes in consumption of the jth individual (group). The specified assumptions on distribution of increments of income give :

$$\begin{aligned} z(t) &= \sum_j x_j(t)w \\ &= wTx(t) \end{aligned}$$

where w is the column vector w_i and T the column-totalling row vector of units. The ultimate value of the column vector of total-income increments, provided the system converges, is :

$$Z = wT[I - (I - A)^{-1}CwT]^{-1}[I - A]^{-1}k$$

where k is the initial change in consumption which starts the system; thus

$$x(0) = [I - A]^{-1}k$$

and in the case of income redistribution,

$$k = Cz(0)$$

However, if the increments of income accrue to individuals as soon as they occur, the equation will be

$$x(t + 1) = Ax(t) + Cz(t)$$

with total income changes :

$$Z = wT[I - A - CwT]^{-1}\,k.$$

It will readily be seen that the final results are the same; it can also be demonstrated that the condition for convergence is in each case

$$\sum_i w_i C_i D_i < 1^1.$$

This is clearly owing to the implicit assumptions contained within the linear-equations approach to this problem, that reactions to our income and consumption of others are independent and that the final result also does not depend on the speed with which any of the interdependence effects and their repercussions work themselves out. Assumptions of this kind are, of course, inherent in any linear-equations approach, but it would seem to be peculiarly dangerous in a problem of this kind, which is concerned entirely with imponderable psychological reactions, to obscure thus, by concealed assumptions, many of the inherent difficulties of the problem.

[1] This is the result given by Mr. H. G. Johnson in the essay previously mentioned.

VI—Conclusion

To conclude, it would appear that considerations of interdependence of consumer behaviour may be a valid and important part of the historical analysis of the manner whereby the appearance of new consumption goods on the market (or any similar slow change in the pattern of consumer behaviour) generates increases in activity in the economy. However, in the absence of strong evidence to the contrary it does not appear that theoretical analysis of interdependence effects can modify to any significant degree the usual conclusions regarding policy for redistribution of income. For such analysis must either content itself with mere enumeration of possibilities, or, if based on initial postulates of consumer behaviour, can only indicate the whole host of further intractable complications which must be added to the already obscure problem of estimating the total effect of a specified redistribution of income.

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Comment

Absence abroad has prevented me from making more than a brief comment on the above article before it goes to press. While I agree with the authors on the desirability of deriving results from individual behaviour assumptions, I was unable to find reasonably acceptable assumptions simple enough to yield useful results, and therefore adopted the "sociological" method.[1] I would argue that more useful results can be obtained by doing this than by making dubious assumptions about individual behaviour such as the inconsistency assumed in Postulate 7.[2] Even on their assumptions, however, the authors provide no argument that I can find to support their conclusion that the interdependence effects of income-redistribution can in practice be ignored.

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[1] Incidentally, the authors' repeated assertion that my "competitive society" can arise when everybody is "emulative" is entirely wrong; their recognition of this is concealed in the casual parenthesis on p. 71, lines 4–5.

[2] It also seems to me that Postulate 8 is inconsistent with Postulate 7.

THE THEORY OF FEDERAL FINANCE

THE word "federation" suggests the union of two or more states. Usually the origin of such a federal state is through a process of integration. A number of independent states come to realise, in the face of a common danger or for satisfying some common needs, that it is to their own interest to create a new state to which some powers are surrendered so that it can perform certain common services, such as defence, regulation of inter-state and international trade, currency, etc., efficiently and economically. The federating states retain their sovereignty in some respects, but surrender it to the federal government in some other respects. Divided sovereignty is the essence of federalism. Federalism is thus a compromise in its origin and continues to be so in its development.

These federating states are heterogeneous units—they differ in climate, physical features, state of economic development, population, language and sometimes even in customs, institutions and religion. The degree of heterogeneity differs from federation to federation, but they all display a common feature in that they are a union of heterogeneous states. The economic, social and political progress of such heterogeneous groups will be greatly retarded under an integrated, centralised unitary state, and through experience or intuition, they realise that for a fuller development of a people full of diversities it is essential and desirable that some functions should continue to be performed on a regional basis, with partial or full autonomy for the regional governments. There is no attempt to iron out the diversities, they are too deep-rooted and perhaps too precious to be sacrificed, often they are even encouraged for a fuller development of a new nation thus being evolved into existence. In brief, a federal structure is a marriage of unity and diversity, and is the political outcome of the desire of independent states to achieve a union without surrendering their individual identities.

Thus most modern federations such as the United States of America, the Commonwealth of Australia, the Dominion of Canada, Switzerland, etc., are a result of a process of integration. On the other hand, in Brazil, the Union of India and the Union of Soviet Socialist Republics (if the regional governments at all have some independence) we have examples where federalism has been evolved through a process of disintegration. A unitary government composed of heterogeneous regions finds that for the sake of

efficiency and economy it is desirable to disintegrate into smaller regional governments which are given independent powers over certain functions which can be more efficiently performed on a local or regional basis. This devolution of functions is accompanied or soon followed by grant of fiscal autonomy in the interest of economy and efficiency. In this way the divorce of taxing and spending powers is avoided and the principle of financial responsibility is adhered to. Whether federalism is the result of a process of integration or disintegration, it is an indissoluble union of two or more heterogeneous states. If these federating states are homogeneous their union will ultimately result in a unitary state where there will be no clash on a geographic or regional basis, which is inevitable in a federation due to the heterogeneous character of the federating states. Rightly did Napoleon observe in 1803, while opening the Council of Switzerland, which he had himself set up, "Switzerland resembles no other state in regard to its history, its geographical and topographical position, its languages and religions, and lastly its extraordinary diversity of customs and manners. Nature has made you into a federal state; no wise man will run counter to nature." For some countries the political form of government should be federal in character because their regional diversities are unsuited to a unitary constitution.

It is necessary to sound a note of caution here that no country is completely federal, just as none is completely unitary. Even in unitary countries there are heterogeneous regions and some fiscal autonomy for local or regional authorities, just as in federal countries even heterogeneous regions may be homogeneous in some respects. While we notice increased fiscal autonomy to local authorities in unitary countries, modern developments in the economic and political sphere have tended to increased centralisation of finance and functions in federal countries. This development has been rendered possible through the enormous capacity for adaptability displayed by federalism in almost all federal countries. The result has been that the orthodox conception of federalism, where national and regional governments had coordinate independent powers and the latter resented any encroachment on their sovereignty, has become an historical anachronism. Even in the United States of America, as Wendell Wilkie put it, the worn-out issue of states' rights versus a strong federal government is not an issue, it is a relic. Modern federalism is a cooperative federalism where the two layers of government do not have completely exclusive functions and the state governments, in particular, are not fully sovereign within their assigned

sphere of activities. It should, however, be noted that when a unitary state grants some fiscal autonomy to local or regional authorities this surrender of powers is a concession and not based on any constitutional provision. Unlike a federal government, a unitary state suffers from no defect of constitutional authority in its exercise of fiscal powers. Obviously the Theory of Public Finance that applies to a unitary state will need some modifications in its application to a federal state.

The Theory of Public Finance in a Unitary State

All public finance operations ultimately resolve into a series of transferences. The state taxes some people in order to spend the revenue therefrom on the same or/and other people. Taxation is an evil in the sense that it always imposes a sacrifice on those who pay it. Their incomes are reduced to the extent of the tax payment, and thus they cannot utilise their surrendered income for their own benefit. Knowing full well that taxation imposes a sacrifice, the state still prefers to tax because it knows equally well that the benefits accruing to the people and to the society from its expenditure, financed out of tax revenue, are greater than the sacrifice imposed. Since taxation is a necessary evil, necessary in the sense that without it the state cannot raise funds which it spends to confer benefits, that imposes some sacrifice on the citizens of a state, it should be the object of the state to make this sacrifice minimum, whatever the amount of revenue it raises. We, therefore, come to the conclusion that the state should tax in accordance with the Principle of Least Aggregate Sacrifice. The aggregate sacrifice for the nation as a whole is least when marginal sacrifices of individual tax-payers are equal. On the other hand, state expenditure confers benefits on the people and the society. The state's objective here is to make this benefit maximum whatever the volume of expenditure. Here, again, the state is interested in making aggregate benefit maximum, and so it incurs expenditure in accordance with the Principle of Maximum Benefit. This is achieved when the marginal benefit of each item of expenditure is equal. Thus we see that the state should spend in accordance with the Principle of Equi-Marginal Social Benefit.

It will be noticed that the Principles of Taxation and Expenditure explained above only tell us the scheme of state taxation and expenditure respectively.[1] They throw no light on the volume of

[1] Professor B. P. Adarkar objects to the technique of considering the principle of taxation and the principle of expenditure separately. He says, "It is often said that given a particular amount of revenue that has to be raised through

taxation or expenditure at any given time. The volume of taxation and expenditure are interdependent. The state can spend only as much as it raises in revenue. On the other hand, it raises only that amount of revenue which it can profitably spend. For every unit of revenue it raises and spends, it compares the sacrifice imposed in raising that revenue with the benefits that will be conferred in spending it. So long as this resultant, the difference between benefit and sacrifice, is positive there is a net gain because the nation benefits to that extent. Now, as more and more units of tax revenue are raised they impose increasing sacrifice, because the earlier units tax the less valuable, or the marginal, portions of individual incomes. On the other hand, successive units of expenditure yield diminishing benefit in accordance with the Law of Diminishing Utility as applied to state expenditure. Thus a point is reached where the benefit derived from a unit of public expenditure is just equal to the sacrifice imposed in raising that unit of taxation. Here the state stops. We thus arrive at the Principle of Public Finance, which says that the *optimum* of public finance activities is reached when taxation and expenditure are carried to that point where the benefit derived by the marginal unit of expenditure is equal to, or slightly more than, the sacrifice imposed in raising that unit of revenue.

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taxation . . . there could be erected only one ideal scheme of taxation—whatever be the manner in which the revenue is expended. On the other hand, it is asserted that given a particular amount of revenue, by whatever method of taxation be it collected, there is an ideal manner in which it could be spent. Such reasoning is fallacious. . . . The best way in which a given amount of money could be spent can only be devised when it is known what are the relative post-taxation positions of the tax-payers. Similarly, the ideal manner of distributing the burden of taxation . . . cannot be imagined so long as the distribution of the compensating element of expenditure among the tax-payers is not known, as there is always the possibility of the latter nullifying the *optimum* of the former distribution." (*The Principles and Problems of Federal Finance*, pp. 198–9.) In our analysis we do not ignore the effects and counter-effects of taxation and expenditure. The scheme of taxation will certainly be affected by the effects of expenditure, as we will have to consider the post-expenditure position of the people. So also our scheme of expenditure will consider the post-taxation position of these people. It is true that the effects of taxation and expenditure are continuously acting and reacting upon the people; the scheme of taxation/expenditure should consider these actions and reactions. But even when we take this into account we can certainly, for theoretical analysis, consider "taxation" and "expenditure" schemes separately. In Economics, as in other sciences, this type of analysis is quite feasible and desirable. We can study the effects of different forces separately without ignoring the effects and counter-effects of other forces. This is done in solving other problems in economics such as in The Theory of Value or The Theory of Distribution, where the several acting forces are interdependent, yet we can and do study the problem of price, demand, supply, wages, interest, profits, etc., separately, in each case not ignoring the effects and counter-effects of other forces.

In a unitary country there are no constitutional limitations on the power of the central government, even when there is considerable fiscal decentralisation, and consequently it is possible for the national government to evolve a scheme of taxation and expenditure which achieves the Principle of Public Finance for the entire state as a whole. If some gaps are created by the activities of local governments, they can be filled and corrected by the national government, which has supreme authority in the sphere of taxation as well as expenditure.

The Principle of Federal Finance

The Principle of Federal Finance should obviously mean the principle which the national and the regional governments should follow in their fiscal operations. In their own sphere of activities each regional government is concerned with the welfare of its own citizens, and it should obviously follow the Principle of Public Finance. Similarly, this is also the correct principle for the national government to follow, but it can observe it only within the sphere of functions and resources assigned to it. Considering the federal and the federating units in isolation, obviously for each of them the correct principle is the Principle of Public Finance. But when each government follows this principle within its own sphere there is no guarantee that the principle will be followed for the nation as a whole. Since the federating units are of a heterogeneous character and differ in economic prosperity, it can be asserted with certainty that the Principle of Public Finance will be violated when we simultaneously consider the fiscal operations of the national and the state governments. The federal government carries its taxation and expenditure to the point where, with respect to federal functions only, the aggregate sacrifice of the last unit of taxation is just a little less or equal to the benefit derived from expenditure financed out of this revenue. Thus it equates the sacrifice imposed by the marginal unit of taxation, let us suppose x, to the benefit derived, let us suppose y, from the marginal unit of expenditure. The different state governments also act in a similar manner, and thus State A equates the sacrifice imposed (on its citizens) by its marginal unit of taxation, let us suppose a, to the benefit derived (by its people in their joint as well as individualistic capacity), let us suppose a_1, from its marginal unit of expenditure. Similarly States B, C and D, etc., respectively equate b to b_1, c to c_1, d to d_1, etc., where b, c, d . . . represent sacrifice imposed (on their citizens) by their marginal units of taxation and b_1, c_1, d_1 . . . represent benefit derived

(by their people in their joint as well as individualistic capacity) from their respective marginal units of expenditure. Whatever the constitutional limitations on their taxation powers and functions (that is, expenditure powers), each one of the states can follow the Principle of Public Finance with respect to the functions and resources assigned to them. Now, as we know the different states are heterogeneous in character, some of these states are rich while others are comparatively poor. We can arrange these different states in order of their richness—the richest state coming first and the poorest state last. Let us suppose that A, B, C, D, etc., is the arrangement of states in order of their richness. Now, in richer states the sacrifice imposed by the first unit of taxation is less than in a comparatively poorer state, because it will be levied on comparatively richer people, whose marginal income has comparatively smaller utility. On the other hand, the benefit derived from expenditure financed out of this unit is comparatively less in a rich state, because with higher income levels the need for state services is less. From this it follows that the equality, between the sacrifice imposed by marginal unit of taxation and benefit derived from marginal unit of expenditure, in a rich state is brought about at a *lower* level (in terms of magnitude of the units of sacrifice/benefit) than in a comparatively poorer state. Thus a is smaller than b, which in turn is smaller than c and so on. Now $a < b < c < d \ldots$ and so also $a_1 < b_1 < c_1 < d_1 \ldots$. Obviously, from the point of view of the nation as a whole, there is a distinct advantage in taxing the richer states more and spending that revenue in poorer states. The richer states can object to such a transfer in their individualistic capacity, just as a rich man may object to being taxed for the benefit of the poor, but this objection will be invalid from the point of view of all the states taken together, that is, from the national viewpoint. This transfer cannot be effected by any state individually, hence this function must be entrusted to the national government in a federation. The federal government should not therefore content itself by merely following the Principle of Public Finance in the limited sphere of functions and resources assigned to it, but should act in a co-ordinating capacity to effect such transfers so that the Principle of Public Finance is not violated for the nation as a whole. Unless it assumes this co-ordinating function as well a federal form of government suffers from a serious theoretical defect from the point of view of the science of Public Finance. It is thus the essential function of the federal government to achieve economic equilibrium for the country as a whole,

in the sense that it should try to follow, taking into consideration state fiscal activities, the Principle of Public Finance for the nation as a whole.

The Principle of Taxation in a Federal State

When independent sources of revenue are assigned to the federal government and the units, which are autonomous, each will act in its own sphere according to the Principle of Least Aggregate Sacrifice, so far as taxation is concerned. The federal government equates the marginal sacrifice of tax-payers falling within its jurisdiction, that is, for the nation as a whole. But it can achieve this equality with respect to federal taxation only. Similarly, the states will formulate their taxation policies in such a manner that the marginal sacrifice of different tax-payers within their respective jurisdictions is equal. The federal government and the states can succeed in equating marginal sacrifices of all only if they have tax jurisdiction over all citizens. It is conceivable that there may be constitutional restrictions on the taxing powers of the federal and state governments which prevent them from taxing some people. For example, in the United States prior to 1939 federal employees were exempt from state taxes on income, and state employees were not subject to the federal income tax. Thus the state and the federal government were prohibited from levying the income tax on people whom they were obliged to protect and for whom they were obliged to provide services as to their other citizens. If this restriction was extended to all taxes then the states and the federal government could succeed, even in theory, in equating the marginal sacrifice of only those citizens whom they could tax. Even this limited restriction was an awkward handicap, because the income tax can be more easily related to ability than any other tax. Thus we see that in a federation the states and the federal government may be subject to such constitutional restrictions that even within their respective spheres they are unable to equate marginal sacrifices of their citizens. In order, therefore, that the federal and the state governments may succeed in following the Principle of Taxation, they must have the power to levy taxes on all people, without any special preferences for some citizens. To the extent such preferences or exemptions from state/federal taxation exist the Principle of Taxation is violated even within their respective spheres of taxation.

There is another difficulty in a federation. The several states differ in economic development and prosperity besides exhibiting other diversities. Hence, when each state equates marginal

sacrifice of its tax-payers it is very unlikely, almost impossible, that the marginal sacrifice of tax-payers in state A is equal to the marginal sacrifice of tax-payers in other states. Thus marginal sacrifice of tax-payers is equal as compared to other citizens within their state, but is unequal as compared to the marginal sacrifice of people residing in other states. In richer states this marginal sacrifice is less than in poorer states because they tax a comparatively wealthier set of people. The result is that from the national viewpoint while the burden of federal taxation is equitably distributed, because the federal government equates the marginal sacrifice of all the people within its jurisdiction, the burden of state taxation is inequitably distributed, because the marginal sacrifice of state taxation is different from state to state. We thus see that when the federal and the state governments each follows the Principle of Taxation in their respective spheres the ideal of taxation is not achieved for the nation as a whole. This ideal is achieved only when the effect of the taxation activities of the federal and state governments is such that the marginal sacrifice of the sum total of federal and state taxation is equal, or as nearly equal as possible, for every person who is a citizen of the federation. Thus alone will similarly placed persons in different states have similar burdens of federal plus state taxation and the aggregate sacrifice for the nation as a whole will be least. Unless this is done, federalism suffers from a theoretical defect, and in this respect a unitary form of government is superior.

This theoretical defect cannot be removed by state governments acting separately, because their authority is restricted to their respective boundaries and the people living therein. They can, however, remove this defect in their joint or corporate capacity by acting in unison, and for this the federal government is the proper authority. The states will still tax within their own spheres according to the Principle of Taxation, but the federal government will discriminate in its scheme of taxation in order to make the marginal sacrifice, of state plus federal taxation, of all citizens equal. The states who suffer adversely, or to be more correct whose residents suffer more adversely, under such a scheme of taxation can object to it only from their narrow, individualistic or separatist points of view. As parts of a single nation they have to yield, as the total sacrifice imposed on the people as a whole is thereby reduced, and this is desirable from the point of view of the nation as a whole.

The Principle of Public Expenditure in a Federal State

In a federation the states have autonomy with respect to the functions assigned to them, and they allocate their revenues between various items of expenditure, which they have to incur in discharging their functions, in accordance with the principle of public expenditure which they consider to be correct. As we know this principle is the Principle of Equi-Marginal Social Benefit which maximises the benefits from public expenditure for the state as a whole. Each state tries to equate

$$\frac{\text{Marginal benefit from expenditure on item "K"}}{\text{Size of unit of expenditure on "K"}} = \frac{\text{Marginal benefit from expenditure on item "L"}}{\text{Size of unit of expenditure on "L"}} = \frac{\text{Marginal benefit from expenditure on item "M"}}{\text{Size of unit of expenditure on "M"}}$$

and so on.

Where the size of unit of expenditure on different items of expenditure, K, L, M, . . . etc., is assumed to be equal, we may say that each state tries to evolve a scheme of expenditure where marginal benefit from different types of expenditure is equal or as nearly equal as possible. Similarly, in its scheme of expenditure the federal government follows the same law, and it also equates marginal benefit derived from different items of expenditure which it has to incur in discharging functions assigned to it. When each state follows the Principle of Expenditure within its functional jurisdiction the result is that the marginal level of benefit differs from state to state. The level of marginal benefits is lower (in terms of units of benefit) in richer states and comparatively higher in poorer states, as they have smaller resources to spend on a people in greater need of state services. This inequality is not corrected when the federal government merely confines its attention to equating marginal benefits from expenditures falling within its own sphere of activities only. Apparently there is a distinct advantage in reducing public expenditures in richer states and increasing them in poorer states, where the same expenditure, up to a certain limit, will yield more benefit.[1] It is, therefore, obvious that when the states spend their revenue within their respective functional juris-

[1] If we consider taxation and expenditure levels simultaneously, the real need is likely to be not to reduce the level of expenditure in richer states but to increase their burden of taxation in order to spend more in poorer states.

dictions in accordance with the Principle of Public Expenditure it is essential for the federal government to take those levels of marginal benefits into consideration in framing its own scheme of expenditure. If the federal government takes such a view, and this is the correct view for it to take, then it will adopt such a scheme of expenditure, as will tend to iron out the differences in the marginal levels of benefits flowing from schemes of state expenditure, and in order that national benefit from state and federal expenditures may be maximum, it will not stop here, but proceed a step farther and equate these marginal levels with the marginal benefits derived from different items of expenditure on federal functions. Thus from the national standpoint benefit derived from public expenditure is maximum when :

> Marginal benefit from different items of state expenditure (such as education, public health, law and order, etc., etc.) in state A
>
> = Marginal benefit from different items of state expenditure in state B, C, D . . . etc.
>
> = Marginal benefit from different items of federal expenditure (such as defence, civil administration, etc., etc.).

For the federal government, therefore, the conception of benefit is not merely the benefits flowing from its own items of expenditure considered in isolation but this flow of benefits compared to benefits accruing from schemes of state expenditures. Thus considered, benefits from the federal viewpoint will be maximised when more is spent on backward and poorer areas, either directly or preferably [1] through the government of those states, so that expenditure on those areas is pushed to the point of equating marginal benefits in all states. It is essential that there should be no constitutional hindrances that prevent the federal government from acting in this manner which necessarily involves a flow of funds from federal to state treasuries.[2] Thus conceived, a

[1] So that the federal government does not enter directly into those spheres of activity which are usually assigned to the states in the interest of efficiency.

[2] At the present time a system of federal grants is found in almost all federations. In the Commonwealth of Australia there is a constitutional provision for such grants (see sections 87, 96 and 105 A of the Constitution Act). So also in the Union of India (*vide* Articles 269, 270, 272, 273 and 275 of the Constitution). Though federal grants are now an accepted feature of federalism in the United States, it is necessary to emphasise the strong opposition that existed to such schemes of federal assistance in the nineteenth century. Vetoing the Morill Bill, granting aid to the states for establishment of colleges for the benefit of agriculture and mechanical arts, President Buchanan observed : " Should the time arrive when the State governments shall look to the Federal Treasury for the

federal scheme of expenditure (including grants in aid to states) is complementary (filling up the disparities between states *inter se*) and supplementary (increasing social benefit by incurring expenditure on functions other than those performed by the states) to the schemes of state expenditures. In this sense the Principle of Public Expenditure is also the Principle of Federal Expenditure.

The Theory of Federal Finance

The above discussion makes it clear that there is not a fundamentally different theory and set of principles of public finance that apply to a federal form of government. The Principle of Taxation, The Principle of Expenditure and The Principle of Public Finance, which respectively tell us how the state should tax, how it should spend and how much it should tax and spend, are the same for unitary as well as federal finance, but they have to be interpreted in the manner explained above in their application to a federal form of government. A practical financier may object to this theoretical dissertation and ask, " Of what use are these delicate and exact precepts which can not be applied equally exactly in a practical scheme of taxation and expenditure? " It is indeed true that we have been discussing problems where the data are not easily measurable or exactly determinate, because the effects of public-finance activities are so widely diffused and intermixed. That, however, is no reason why our principles should not be as exact and as refined as possible. If the principles are correct, the only mistake that a financier may make is that his actions may fall short of the principles. Such mistakes are multiplied when the action is in pursuit of easy but incorrect principles. Though the difficulties in practice are enormous, it is necessary to remember that no financier starts from a clean slate. He begins with a given scheme of taxation and expenditure, and usually he has to take a decision to raise or to spend some more millions of pounds or rupees or to make some desirable changes here or there in the existing scheme. This piecemeal and gradual approach reduces the difficulties of his task and helps him to make wise decisions.

The above discussion, however, enables us to suggest certain general rules. In the first place the federal government must have the constitutional authority to tax all people who are its citizens, and in addition have the power to levy direct taxes, which can be

means of supporting themselves and maintaining their systems of education and internal policy, the character of both Governments will be greatly deteriorated." *Messages and Papers of the President*, V, 544, February 24, 1859.

closely related to ability, so that it can evolve a scheme of taxation in accord with the Principle of Taxation. Since it is difficult and expensive to collect direct taxes from people with low levels of income, it is essential that the federal government should have the authority to levy some indirect taxes also, such as customs and excise duties, so that its scheme of taxation could be made not only progressive but comprehensive as well. Secondly, the constitution should provide a scheme of federal grants in aid so that the federal government can make up the marginal deficiencies in poorer states and follow the Principle of Public Expenditure for the federation as a whole. These grants, which will involve a transfer of funds from federal to state treasuries, should be distributed on such a basis that they ensure financial responsibility on the part of state governments without jeopardising the essential requisites of fiscal autonomy which is an important advantage of federalism. The essentials of federalism will thus be preserved and, if at all, it will be only in this marginal region that state autonomy or sovereignty may be slightly compromised or circumscribed in the broader national interest. A system of grants will ensure not merely budgetary equilibrium for the poorer states by making their resources equal to their needs but will also ensure economic equilibrium for the nation as a whole by enabling the federal government to follow the Principle of Public Finance in its wider interpretation as explained above. It also ensures the economic, social and political stability of the federation, because " Poverty anywhere is a danger to prosperity everywhere " (Philadelphia Charter). Thirdly, the division of functions and resources between the federal and the state governments should be based on the principle of efficiency and economy. Ordinarily such a scheme of division will leave too few resources with the states, because due to the ramifications of big business, the integration of economic life and the importance of international trade the more productive sources such as taxes on income or inheritance, Customs and Excise duties, are more efficiently administered by the federal government. On the other hand, the increasing acceptance of the concept of a welfare state necessitates expanding expenditures on social services, which have to be organised on a state basis in the interest of economy and efficiency and to allow for diversities between different regions. These disparities can be met by a system of grants proposed above. However, in order to ensure fiscal autonomy to the states it is desirable that besides the assignment of some sources of revenue exclusively to the states there may be a scheme of shared taxes,

These taxes can obviously be taxes assigned to the federal government, but the constitution may declare them to be shared taxes and also allocate a certain minimum percentage of the revenue as the states' share which can be increased through federal legislation. The distribution of the states' quota amongst the different states should not rest on the basis of collection or population but in accordance with the principles outlined above, so that the federal government can discharge its function of ensuring economic equilibrium for the country as a whole. A statutory provision will ensure fiscal independence and stability to state budgets. The federal power to increase the states' quota will introduce elasticity into the system, and its power to determine the separate shares of the different states will enable it to follow the Principle of Public Finance for the nation as a whole. Obviously the income tax is a very suitable tax to be a shared tax, because in all modern capitalistic communities it has been found to be a very productive and highly elastic source of revenue. If necessary, some other specific taxes could be added to the list, depending upon the situation in the different federations. No set pattern will suit them all.[1]

In the light of the above principles federalism is not a union of independent states, where the federal and state governments act like independent sovereign authorities, but it is an association of states which co-operate like the members of a family for maximising benefits from the point of view of the nation as a whole. And hence we think that modern federalism is a co-operative federalism.

The above discussion also makes it clear that the apparent theoretical defects of federalism really resolve into a theoretical superiority of a federal state. From the point of view of all the states in a federation the sum total of net benefits (that is, aggregate benefits of public expenditures minus aggregate sacrifice of taxation) is greatly increased if these states join together into a federation. If this analysis is carried farther we come to the interesting conclusion that though from the point of view of richer sovereign national states it may be advantageous that these separate states continue to maintain their individual identity and preserve their sovereignty, yet from the point of view of

[1] The scheme of division of resources adopted in the Constitution of the Union of India follows in broad outline the rules laid down above. It is, however, unfortunate that the system of grants is not *yet* based upon the principle analysed above. It may be hoped that the Finance Commission may improve the situation. In no existing federation is the system of grants based upon the concept of "economic equilibrium" explained above.

humanity—the people of the world as a whole—a world federation of states is theoretically desirable. In that case the aggregate net benefits of the public finance activities of the world as a whole will be greatly increased, because it will be possible to follow the Principle of Public Finance in a wider sphere. Besides, for such a world federal state it will be possible to reduce considerably the astronomical expenditure on defence, and to utilise these resources for increasing the standards of living of the people at large.

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1948–49 RECESSION RE-EXAMINED

IN the March 1952 issue of this JOURNAL Professor Hamberg states that " . . . the most important explanation of the [1948–49] recession . . . is an underconsumptionist one." [1] Such a conclusion depends partly on the criteria employed to classify recessions. On certain criteria most recessions would be classified as underconsumption. (*a*) It seems probable that the average propensity to spend of consumers tends to decline as higher levels of income are reached. This is because of the consumption lag; *i.e.*, the delay which consumers ordinarily exercise in their adjustment to rising or falling income. The propensity to spend is sufficiently irregular, nevertheless, that average propensity may not be declining at all downturns. (*b*) Investment invariably rises more rapidly than consumption expenditure in prosperity. Therefore consumption represents a smaller proportion of total expenditure at the downturn than it does at the upturn, if we abstract from government and rest-of-the-world expenditure.

An underconsumption classification, however, may assign a primary role to consumption in initiating the downturn. Professor Hamberg appears to believe that the 1948–49 recession particularly may be classified as underconsumption in some more rigorous sense. He states :

> " Three important areas of the economy must be made to share the responsibility for the recession. These were a decline in the ratio of total consumption to national income and a sharp decline in the rate of growth of consumption, a policy of monetary restriction carried out by the Treasury and Federal Reserve System, and a sharp and abrupt decline in the country's merchandise export trade. These factors have been listed in their order of importance as they appear to the present writer." [2]

It is the contention of the present writers that a more adequate analysis of the available data will demonstrate that Professor Hamberg exaggerated the role of consumer expenditure in producing the downturn which occurred in late 1948. The apparent importance of consumer expenditure resulted from : (1) the comparison of consumption with national income rather than with

[1] D. Hamberg, " The Recession of 1948–49 in the United States," ECONOMIC JOURNAL, Vol. LXII, 1–14 (March 1952), p. 7.

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disposable income, and (2) the use of annual data rather than quarterly or monthly data to trace the momentum of the business cycle.

The use of national income as an aggregate with which to compare consumer expenditure is quite crude, owing to the fact that consumers spend from disposable income (personal income less taxes) rather than from national income. Since comparison with the latter is influenced by changes in taxes, changes in retained corporate earnings, etc., the more meaningful comparison

TABLE I

Consumer Expenditure as a Proportion of Disposable Income [1]

(Billions of dollars at annual rates)

Quarter.	Disposable income.	Consumption expenditure.	Ratio of consumer expenditure to disposable income.
	$	$	
1947—4	176·5	171·3	0·971
1948—1	179·8	174·6	0·971
1948—2	187·8	177·5	0·945
1948—3	193·0	179·7	0·931
1948—4	192·8	179·8	0·933
1949—1	188·6	178·4	0·946
1949—2	186·7	180·0	0·964
1949—3	184·8	180·0	0·974
1949—4	185·7	182·3	0·982

[1] *National Income Supplement to the Survey of Current Business, 1951 Edition* (Washington: Government Printing Office, 1951), pp. 209–11. Seasonally adjusted figures are employed. It may be noted that since this article was set up in proof, fractional revisions have been made in the 1949 figures. See *Survey of Current Business*, July 1952. The conclusions are not affected.

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In that industrial production reached a peak around October or November, the downturn may be tentatively fixed at this point. Yet it will be observed that consumer expenditure as a proportion of disposable income declined more rapidly in the first half of 1948, and actually rose slightly in the last quarter. The decline in the first half of 1948 was not surprising in view of the fairly rapid increase in disposable income. An important factor helping to produce this result was the tax reduction which occurred in the second quarter of 1948. The normal lag in consumer reaction to such a "windfall" accounts for perhaps half of the decline from the first to the second quarter. In spite of the moderate decline, proportionate consumer expenditure remained at an abnormally high level for peak prosperity throughout the entire

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period. Also, emphasis may be placed on a slight rise in consumer expenditure in the fourth quarter of 1948 in face of a slight decline in disposable income, and in face of a reimposition of consumer credit controls. Rather than signifying underconsumption, a vigorous consumer expenditure function is indicated.

Professor Hamberg is impressed with the fact that a reduced acceleration in consumption expenditure is shown if the change from 1947 to 1948 is compared with the change from 1946 to 1947, during which time an increased acceleration occurred in national income, if similarly measured.[1] This observation is not relevant, however, for the period is far too long to trace business-cycle momentum. Over shorter periods near the downturn the decrease in acceleration is much milder and consumption expenditure is closely correlated with income. Professor Hamberg is pointing to the longer-period influences of the Second World War on the consumer expenditure function, and this has little relation to the 1948–49 recession. Consumption expenditure represented an abnormally small proportion of disposable income in the Second World War, and made what is generally believed to represent a surprising recovery in 1946. Nevertheless, until the second quarter of 1947 the rise in consumption expenditure had continued to outstrip that in disposable income. Consumption expenditure became approximately equal to disposable income in the second quarter. So large a relative expenditure at high prosperity levels could not be expected to continue for long, and disposable income began immediately to fall back to more reasonable relative levels. The war-induced abnormal increase in consumption expenditure relative to disposable income from 1946 to 1947 accounts for the reduced acceleration found by Professor Hamberg.[2]

The rate of change in consumption expenditure from quarter to quarter is shown in Table II, together with similar rates for gross national product, national income and personal income. The general decline which was occurring in the momentum of the

[1] *Op. cit.*, pp. 7–8.

[2] Some of Professor Hamberg's statements are hard to understand. He states " sales of non-durable consumer goods had shown a marked decline in their rate of increase all during [1948] " (*op. cit.*, p. 8). The fact of the matter is that the Department of Commerce measures show that the rate *increased* from the second to the third quarter, but changes were slight throughout the year. See *National Income Supplement* referred to in the tables, p. 207. At another point he states that " thus in the face of these record profits, dividends were 10% and 13% less in the second and third quarters of 1948 than they had been in the corresponding quarters of the previous year " (*op. cit.*, p. 4). According to Department of Commerce figures, dividends in 1948 *increased* 11% and 16%, respectively, in these quarters in comparison to the same quarters in the preceding year (*National Income Supplement, op. cit.*, p. 211).

expansion should not be a surprise to anyone, especially in view of the fact that the prosperity had reached a point where only limited unemployed labor force as well as other economic resources were available. The reduced acceleration is more regular in the case of

TABLE II

Business-Cycle Momentum as Measured by Percentage Change from the Preceding Quarter [1]

Quarter.	Consumption expenditure.	Personal income.	National income.	Gross national product.
1947—1	+2·2	+1·3	+0·7	+1·6
1947—2	+2·8	−0·6	+2·2	+3·4
1947—3	+2·3	+4·2	+1·8	+0·6
1947—4	+2·2	+2·8	+4·2	+4·8
1948—1	+1·9	+2·3	+3·2	+1·6
1948—2	+1·7	+2·7	+4·0	+3·9
1948—3	+1·2	+2·2	+1·7	+2·1
1948—4	+0·1	0·0	+1·3	+1·4
1949—1	−0·8	−2·7	−3·6	−2·8

[1] See reference cited in Table I. Seasonally adjusted figures are employed.

consumption expenditures, but does not average significantly different from that occurring in the other series. The declining rate of increase of consumption expenditures *per se*, therefore, cannot be isolated and assigned an important role in initiating the downturn.

The downturn in the autumn of 1948 is most clearly related to the behavior of inventories. In fact, the decline in inventory investment completely accounts for the decline in gross national product from the fourth quarter of 1948 to the fourth quarter of 1949. Table III clearly demonstrates this. Some of the other expenditure streams rose, notably government, and some fell, notably other investment, but these movements offset each other.

TABLE III

Comparison of Gross National Product and Inventory Investment [1]

(Billions of dollars at annual rates)

Quarter.	G.N.P.	Inventory investment.
	$	$
1948—4	267·0	7·2
1949—1	259·5	0·3
1949—2	257·9	−4·1
1949—3	256·5	−2·9
1949—4	255·5	−6·1

[1] See reference cited in Table I, p. 207. Seasonally adjusted figures are employed.

The most reasonable explanation of the decline in inventory investment is change in the price situation. Wholesale commodity prices rose 60% from the post-war business cycle trough in February 1946 to the price peak in August 1948.[1] Beginning with August 1948 a noticeable decline set in. Since the expected change in prices is an important determinant of inventory investment, the emergence of a price decline might be expected to lead to a reduction of inventories. It would be foolish to argue, of course, that consumer demand played no part in the weakening of prices. The probable fulfilment of some deferred demand, for example, is a case in point. Rather, it is contended that there were other factors which were more directly responsible in this instance.

(1) Of major importance was the break in food prices which occurred in the early months of 1948. This decline had its origin, for the most part, not on the demand side, but on the supply side. A bumper crop of many foodstuffs in the United States and a general recovery in output of foodstuffs in the rest of the world reversed the extravagant price advances which had occurred.

(2) On the monetary side two factors were significant—the decreasing purchasing power of liquid funds and more restrictive monetary policies beginning in the autumn of 1947. Although prices rose rapidly after the war, currency and bank deposits increased much less, so that liquid funds had come to be a much less potent force, a factor reminiscent of the " Pigouvian effect." Restraining action taken by the Federal Reserve System limited the supply and increased the price of credit. Of prime importance was the reimposition of consumer credit controls in the autumn of 1948, which no doubt restricted the sales of consumer durables.

(3) There were other expenditure streams which were important in reducing aggregate demand, and, consequently, in reducing inflationary pressures. Notable were the reductions which occurred in expenditure for construction and producers' durable equipment especially in residential construction in the first half of 1949.[2] Once a substantial price decline in raw material prices set in, expectation of a decline in prices of houses apparently led to a general reluctance to buy. A general deficiency in demand for

[1] As shown by the *Bureau of Labor Statistics Index*. The February 1946 figure is not a low for wholesale prices. A slow rise had been occurring since before the war.

[2] Professor Hamberg states erroneously that " residential construction rose $1·4 billion [from 1948 to 1949] " (*op. cit.*, p. 11). In current dollars residential construction declined $0·3 billion, while in deflated dollars it remained constant. See *Construction and Building Materials Statistical Supplement*, May 1951 (Washington : Government Printing Office, 1951).

construction at this time, however, is not indicated. Our viewpoint is supported by the fact that when the relevant prices began to rise at the end of 1949 a dramatic increase occurred in housing demand.

(4) The reduced exports of key manufactured products may have played a small part in producing the 1948 downturn. Substantial reduction in the level of activity in producing freight cars and machine tools, for example, occurred because of lower exports in 1948.[1] One may wonder, however, if Professor Hamberg does not make too strong a case when he says reduced exports "clearly provided a sharp jolt to the domestic economy" because there was a large rise in exports in 1947 and a substantial decline in 1948.[2] As Professor Hamberg implies from his mention of the quantitative unimportance of exports, the "sharp jolt" could not have been due to the magnitude of the decline. But it is even more remote that it could have arisen through its effect on expectations. Most of the decline in exports was in the government-financed category. A majority of businessmen interpreted this as a wholesome influence and, irrationally or not, believed exports to be on a sounder basis.

It is worth noting that a decline in inventory investment almost as great as that which occurred in 1948–49 had been experienced from the third quarter of 1946 to the third quarter of 1947. This earlier experience, however, did not produce a recession, because the inflationary forces had not spent themselves at the time. A textile manufacturer recently said to us, in effect, "distributors began to reduce their inventories early in 1947, but they soon found that prices continued to rise and therefore they quickly came back into the market." From 1946 to 1947 expenditures for consumer non-durable goods rose 10% in current dollars, but declined 1% in deflated dollars. From 1947 to 1948 the same type of expenditures declined 2% in current dollars, but rose fractionally in deflated dollars. The support of continued price rises was lacking in 1949.

Professor Hamberg is correct in stating that increased government expenditure provided supporting expenditure in the recession. Although expenditures for private construction declined slightly, rising expenditures for public works much more than made up for the decline. A large increase also occurred in

[1] See *Survey of Current Business*, February 1949, p. 30.

[2] *Op. cit.*, p. 2. It is interesting to note that merchandise exports were declining much more rapidly late in 1949, when the next phase of expansion was getting under way, than they were in 1948.

defense expenditures in 1949. Reduced income taxes made disposable income higher relative to personal income.

Even though declines did occur in private expenditure for construction and equipment, the fact that the decline was limited is of notable importance. Long depressions are marked by major declines in durable investment. It is possible that the support of high levels of durable investment may not be available in the next depression, but Professor Hamberg's pessimism regarding new industries is not warranted. Appraisals are difficult because new industries are always too new to be readily counted. However, electronics, plastics, newer synthetic fibres and antibiotics will occur to anyone in America as illustrations of developing new industries. Professor Hamberg overlooks the fact that the combined effects of many such small new industries may be equivalent to that of one or two large industries. Almost everyone now believes that many civilian applications of atomic energy are to be expected, although few would hazard a guess as to their possible magnitude. The recent expansion of the aircraft industry is very great, but it is uncertain how much would remain if defense activity should collapse.

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1948–49 RECESSION RE-EXAMINED: A REJOINDER

In replying to the comments of Messrs. Bratt and Ondrechen, I shall take up their principal points of contention in the order in which they appear in their paper. First, it is doubtful on *any* criteria whether an underconsumption explanation as such can suffice to explain "most recessions," unless the writers are referring specifically to minor, or inventory, recessions. In terms of recent analyses, major depressions may be said to arise from the failure of national income, *i.e.*, consumption *and* investment, but primarily the latter, to grow at rates proportionate to the growth in capacity. Without elaborating, it is clear that in so far as (1) investment is a major function, not so paradoxically, of investment, (2) major business cycles have, in other than stagnation periods, been characterised by waves of innovational, largely autonomous, investment, while minor cycles have been restricted primarily to fluctuations in inventory investment, and

(3) consumption has, almost without exception, fallen as a proportion of income at the upper turning points of both major and minor cycles, the explanation of major crises lies in the area of fixed investment outlays, with consumption behavior playing a relatively secondary role. But in so far as the comparative maintenance of fixed investment is the reason for the "minor" character of inventory recessions, the plausibility, at least, of an underconsumption explanation of the latter is intuitively patent. Whether or not in any particular instance an underconsumption interpretation is correct is, of course, a matter of empirical investigation. In the present case, this kind of explanation seems most plausible, although I have placed the emphasis more on a downward drift in the position of the post-war (short-run) consumption function, and less on a lag in the rise in consumption along a given function.[1]

Messrs. Bratt and Ondrechen take exception to my expressing consumption as a percentage of national income instead of disposable income. When discussing consumer behavior patterns alone, disposable income is obviously the relevant variable. But when discussing cyclical fluctuations in aggregate income and employment, the correct consumption function is one relating to *national* income. Of course, cognisance must be taken of the behavior of disposable income in relation to national income when discussing the behavior of the latter consumption function, but disposable income then becomes only one of many variables taken into account.[2] Had disposable income fallen in relation to national income during the period under discussion, Messrs. Bratt and Ondrechen would have caught me in serious error. However, far from falling, disposable income actually rose somewhat in relation to national income.[3] As noted, this phenomenon

[1] Cf. "The Recession of 1948–49 in the United States," ECONOMIC JOURNAL (March 1952), pp. 10–11. Hereafter this article will be referred to as "The Recession."

We may pass over the second of the underconsumption "criteria" of Messrs. Bratt and Ondrechen on the ground of irrelevancy, since we are here comparing consumption behavior not between upturn and downturn, but at downturn as compared with the immediately preceding periods.

[2] Systematic analyses of the relation of disposable to national income in the problem of determination of national income and its movements may be found in P. A. Samuelson, "The Simple Mathematics of Income Determination," in *Income, Employment and Public Policy, Essays in Honor of Alvin H. Hansen* (New York, 1948), pp. 133–55, and T. C. Schelling, "Income Determination: A Graphic Solution," *Review of Economics and Statistics* (August 1948), pp. 227–9 to name but two of many such discussions.

[3] In this connection, see the excellent article by M. Cohen, "Post-war Consumption Functions," *Review of Economics and Statistics* (February 1952), pp. 18–33.

originated in reduced personal income taxes, veteran's bonuses, and higher wage and salary payments. Other things unchanged, an increase in the ratio of disposable to national income will act to raise the consumption function (related to *national* income) regardless of " the normal lag in consumer reaction " to rises in disposable income.[1] For consumption outlays will rise to some extent, even if less than proportionately to the rise in disposable income. As long as the latter is true, there will be a tendency for consumption to rise in relation to national income, unless other factors intervene. The decline in the ratio of consumption to national income in the face of a rise in the ratio of disposable to national income serves to emphasise the strength of the other forces at work to push the consumption function downward, viz., the operation of Pigou effects, satisfaction of backlog demands, etc. The stress placed by Messrs. Bratt and Ondrechen on the role of disposable income, correctly viewed, would seem to strengthen the position taken in my analysis of the recession.

Nor, Messrs. Bratt and Ondrechen notwithstanding, does an examination of quarterly data give rise to different results.[2] Referring to their own Table II, there is evident a steady downward trend in the growth of consumption outlays, even though the growth in national income averaged out to a slighly higher figure in 1948 over its 1947 value. But more important is the fact that this downward trend continued during the second and third quarters of 1948, despite the sharp rise in the growth of disposable income (occurring independently of the slowdown in momentum associated with the reaching of the full-employment growth ceiling) during the second and third quarters of 1948. When comparison is made with disposable income (what has happened to this variable in Table II ?), the difference is significant enough to warrant special mention.

Moreover, use of personal consumption expenditures in place of the retail non-durable sales used in my original analysis [3] distorts the picture somewhat. First, and most important, the

[1] I assume that the consumption lag emphasised by Messrs. Bratt and Ondrechen refers to the Duesenberry–Modigliani lag in the ability of households to adjust readily to previously inexperienced levels of real income, and not to the Robertsonian expenditures lag, relating consumption to past, rather than current, income. The two are not the same and may exist each apart from the other. Further, the various statistical and econometric investigations of Metzler, Klein, and others cast strong doubt on the existence of an expenditures lag in consumption in the United States.

[2] This is especially noteworthy in the case of the quarterly figures in my analysis showing the rate of change of retail non-durable sales during 1947 and 1948. Cf. " The Recession," p. 9, Table I.

[3] *Ibid.*, pp. 9–10.

aggregate consumption figures include outlays on consumer durables, and I specifically noted that my observations on consumption behavior were mainly true of non-durables.[1] Secondly, the consumption figures, as opposed to the retail sales data, are more inclusive, inasmuch as they include estimates of consumer purchases from wholesalers and manufacturers and farm production consumed on the farm; this larger coverage makes for a 10% discrepancy in the two series. More important, the retail-sales figures enable us to focus attention precisely at the point where changes in consumption outlay first exert their effects with greatest force.[2]

Finally, Messrs. Bratt and Ondrechen can hardly be serious in repeating after me the reasons for the decline in the ratio of consumption to both disposable and national income as an argument against my underconsumption type of explanation for the recession. It was, and is, obvious that the consumption function was abnormally high because of a combination of deferred demand and an extraordinary liquid-asset position on the part of households, obvious that once the strength of these forces diminished, the consumption function would fall toward its secular position, reducing at the same time the *growth* of consumption. Regardless of the reason, the important thing is that the last two phenomena did occur, and by giving rise eventually to excessive and unintended inventory investment, were the mainsprings of the ensuing recession.

In attempting to assess the accuracy of establishing consumption behavior as the prime mover in initiating the inventory recession, it is well to examine the alternative factors presented by Messrs. Bratt and Ondrechen to explain the recession. Their principal explanation seems to be "the change in the price

[1] Cf. "The Recession," pp. 8–9.

[2] It is partly, but only partly, for this reason Messrs. Bratt and Ondrechen find my statement on the decline in the rate of increase of consumer non-durable sales "hard to understand." If there be any doubt about the behavior of retail non-durable sales, let the reader refer to the *Survey of Current Business*, January 1949, pp. 1–4, particularly Charts 1 and 2, and *ibid.*, October 1950, p. 17. Moreover, unless my arithmetic is malfunctioning, even the personal consumption figures referred to by Messrs. Bratt and Ondrechen do not increase in rate of growth during 1948: from a figure of 2% in the first quarter, the growth rate of this series fell to 0·8% in the third quarter.

Apropos of the apparent discrepancy in figures on the behavior of dividends, my statement referred to dividends as a percentage of net profits, not to the percentage growth in dividends alone. I might also add that my figures were based on the Federal Reserves data for large corporations. As a percentage of profits, the decline in dividends was not as large for all corporations, being in the neighborhood of 5%.

situation," particularly wholesale prices. It is worthy of note, however, that, on the one hand, wholesale prices continued to rise until September, during the period in which inventories were steadily climbing toward and beyond their normal ratios to sales, and on the other hand, these prices continued to fall for six months after the recession ended. Further, the decline in prices that did set in in September 1948 consisted almost entirely of foodstuff prices, which comprise only some 20% of soft-goods inventories; the index of non-food prices did not fall at all during the year, although it did cease to rise after September. Hence it is questionable to what extent this price behavior affected inventory investment decisions in all commodities, especially non-farm commodities. Instead, it would seem more reasonable to place primary emphasis on the accumulation of undesired inventories of non-durables in general at the retail and wholesale levels, which accumulation was causing unhappiness for a considerable time before the change in price behavior. Moreover, lagging consumer demand undoubtedly played a significant part in the weakening of prices, both directly and, through its damping effects on induced investment and the expansion of bank credit to business, indirectly. Although this price behavior, coming when it did, may have reinforced decisions to retrench in inventory investment (except for the price-break in foodstuffs, which originated chiefly on the supply side), it would appear to have been a *secondary* repercussion of the slowdown in the growth of consumption.

From their discussion of the role of the monetary factor, it appears that Messrs. Bratt and Ondrechen have, apparently without being aware of it, agreed with me in one major aspect of my evaluation of this factor and disagreed in another. We agree that credit for the behavior in consumption outlays may be shared among such factors as the great reduction in post-war liquidity (resulting from the dissipation of war-time savings and the post-war inflationary price movements) and the reimposition of consumer credit controls.[1] However, on the matter of the decline in the rate of bank lending to business, I have argued at length that the evidence seems clearly to indicate that this factor did not result from any restriction of credit by the Federal Reserve System and the commercial banks, but rather from a decline in business demand (*schedule*) for loans and a shift in business borrowing to other sources. Rather than repeat the evidence and argument, I refer the reader to my earlier article.[2]

[1] Cf. "The Recession," pp. 6–7 and 10–11.

[2] *Ibid.*, pp. 4–6.

Attempts by my critics to include declines in business (fixed) investment and residential construction among the important factors responsible for the recession seem ill-fated from the outset. For one thing, these variables declined but nominally ($200 million after rising $2·6 billions in the critical middle quarters of 1948) as the recession began.

What decline in fixed investment outlays in the private sector of the economy did occur (during 1949, after the recession was well under way) may be assumed to have been largely of the induced variety, responding to the decline in aggregate output. But the very fact that the recession was minor, was largely confined to inventory investment, is *prima facie* evidence of the strength underlying the demand for the vast bulk of private fixed investment. Thus, for example, even though residential construction fell slightly during the recession, the rent index continued to rise at the same time. And the $1·3 billion (at annual rates) rise in new construction outlays by the fourth quarter of 1949 must be accorded a place of prime importance in a listing of factors responsible for the ending of the recession.[1]

Little comment is necessary on the relative importance of the decline in merchandise exports, for despite the remarks of Messrs. Bratt and Ondrechen, I averred earlier the wisdom of assigning this factor a secondary role.[2] However, the fact that " most of the decline in exports was in the government-financed category " seems to be beside the point. Marshall Plan *expenditures* were largely made by the individual foreign countries, and it is doubtful whether the individual seller knew, or even cared about, the source of financing, so long as the cash register kept ringing. Once orders and sales of exported products fell, for whatever reason, this may be expected to have had some damping effect on anticipations, particularly in an atmosphere already made fretful by the undesired rise in inventories.[3]

In conclusion, Messrs. Bratt and Ondrechen have pointed to

[1] In this connection, I want to thank Messrs. Bratt and Ondrechen for calling attention to my erroneous statement indicating a $1·4 billion rise in residential construction from 1948 to 1949. The mistake arose out of the sudden revision of the basis for calculating the value of this variable, a revision which passed by (until too late) unnoticed. Fortunately, this error did not distort the point made in connection with it, viz., that a surge in residential construction was important as a factor ending the recession. For the rise in total construction mentioned in the text was largely dominated by residential building activity.

[2] Cf. " The Recession," p. 2.

[3] It strains ones credulity to believe that the firms whose sales were involved in the $2·5 billion decline in the volume of (government-financed) merchandise exports during 1948 found this " a wholesome influence."

two influences which may well be added to my list of factors responsible for the 1948–49 recession. The first of these is the behavior of wholesale prices; the second is the slight fall in private fixed investment, particularly new construction. But for the reasons discussed above, these factors still impress the writer as subordinate to the underconsumption-type explanation adduced in my earlier paper.

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THE CAPITAL COEFFICIENT AND THE RATE OF DEPRECIATION

IT is probable that "A Contribution to the Theory of the Trade Cycle" by Professor Hicks will come to be regarded as one of the classic statements of "Neo-Keynesian" trade-cycle theory. It is a short book, expressly designed to give only an outline of the theory. A criticism that a particular factor has been omitted from the analysis is, therefore, only a valid criticism if the factor which has been omitted is of equal importance to one or more factors which have been included. This note is concerned with the failure to take sufficient account of the consequences of the lag between the provision and the spending of finance for the replacement of equipment.[1]

In the most simple static model, Professor Hicks makes the following assumptions:

1. Income received (= output) in any period is equal to the net investment and consumption of that period. Expressed in symbols, $Y_n = I_n + C_n$. Income received in any period is spent in the next succeeding period.

2. Consumption in any period is a function of income received in the previous period. At or below the "Equilibrium"[2] level of income, the marginal propensity to save is zero. The marginal propensity to save is constant and positive for all income received above the equilibrium level.

3. Net investment in any period is a function of the difference between the outputs of the two previous periods. If £v's worth of equipment is required to produce most efficiently each £'s worth of consumption goods:

$$\text{if } Y_{n-1} > Y_{n-2},\ I_n = v(Y_{n-1} - Y_{n-2})$$

if $Y_{n-1} < Y_{n-2}$, negative net investment of $v(Y_{n-2} - Y_{n-1})$ will be undertaken if equipment to this value (at least) is worn out in period $n-1$. If less equipment than this is worn out, excess capacity will develop. This assumed relation between net investment and prior changes in output rests on the further assumption that entrepreneurs always

[1] But see Hicks, p. 67.

[2] "Equilibrium," since this level of income, if maintained, is that at which the economy is in the equilibrium of the stationary state.

try to produce at the optimum point on their long-period cost curves.[1]

4. It is assumed that average money and real costs and prices are constant until "full employment" is reached.

The equations yielded by these assumptions are :[2]

$$I_n + C_n = Y_n$$
$$I_n = v(Y_{n-1} - Y_{n-2})$$
$$C_n = E + (1 - s)(Y_{n-1} - E)$$
$$Y_n = v(Y_{n-1} - Y_{n-2}) + E + (1 - s)(Y_{n-1} - E)$$

The contention of this note is that the whole of any investment induced by an increase in output does not become part of income received in the current period; and the argument can best begin by considering the case in which income remains constant over a number of periods.

For income to remain constant, the amount spent on consumption by consumers must equal the income paid out by entrepreneurs, and the incomes paid out by entrepreneurs must equal the revenue they receive. In other words the propensity to consume must be unity, and entrepreneurs' total expenditure on production must equal total revenue. The second of these conditions requires elaboration. If total expenditure on production equals total revenue, since total revenue is assumed equal to total cost, total expenditure must equal total cost. Expenditure and cost are not the same thing. The cost to which revenue is equated is essentially an accounting concept. If there are only two factors of production, labour (which is paid at the end of each period) and equipment, total cost per unit is composed of factor cost plus depreciation. Depreciation is the amount which is set aside so that the equipment which is being currently used in production may be replaced when worn out. The amount which has to be set aside for this purpose is determined by the quantity of equipment used per unit of output (the capital coefficient v) and the length of the working life of the equipment. Total cost, then, is factor cost plus depreciation.

Total expenditure, however, equals factor cost plus gross investment. If, therefore, gross investment is not equal to depreciation, expenditure will not equal revenue, although revenue is equated to cost. The only case in which depreciation and gross investment will clearly be equal is when output has

[1] Investment other than in equipment is excluded from the most simple model.

[2] If $Y_{n-1} < E$, $s = 0$.

been constant for a considerable time, so that in each period the same quantity of equipment is replaced, gross investment equals this replacement and replacement equals depreciation.

If the length of life of equipment in periods when worked at optimum capacity is denoted by d, depreciation per unit of output per period is $\frac{v}{d}$. Writing w for factor cost, $\frac{v}{d} + w$ equals total cost per unit. When output through time is constant and expenditure equals revenue, $Y_n = wY_n + \frac{v}{d}Y_n = Y_{n+1}$.

Consider now what happens to expenditure and cost when output is increasing and net investment is being undertaken. Suppose that output has previously been constant at E (depreciation and gross investment being $\frac{v}{d}E$) and that the marginal propensity to consume is unity for all levels of income. Assume that in period n income received is increased by A as the result of " autonomous " investment of that amount being undertaken in that period, and consider the consequential changes in period $n + 1$. Since $s = 0$, output is $E + A$. This can be divided into factor cost, $w(E + A)$, and depreciation $\frac{v}{d}(E + A)$. Gross investment rises by the amount of the increase in output in period n over the output of period $n - 1$, multiplied by the capital coefficient, so that it is $\frac{v}{d}E + vA$. Total expenditure, factor cost plus gross investment, is $w(E + A) + \frac{v}{d}E + vA$: this may be written $E + A + vA\left(1 - \frac{1}{d}\right)$, and is Y_{n-1}. Income in period n was assumed to be $E + A$, so that the increase in income in period $n + 1$ is $vA\left(1 - \frac{1}{d}\right)$.

Alternatively, the increase in income in period $n + 1$ may be shown by drawing up a table giving the difference between total expenditure and total cost. The increase in income is the amount of this difference, because total cost = total revenue, which is equal, if $s = 0$, to Y_n.

Total cost (= Total Revenue = Y_n) $\left(w + \frac{v}{d}\right)(E + A)$

Total Expenditure (= Y_{n+1})

$$w(E + A) + \frac{v}{d}E + vA, = E + A + vA\left(1 - \frac{1}{d}\right)$$

Total Expenditure — Total Cost $(= \Delta Y_{n+1})$ $vA\left(1 - \frac{1}{d}\right)$.

For the next period that table reads :

Total Cost (= Total Revenue $= Y_{n+1}$)

$$\left(w + \frac{v}{d}\right)\left\{E + A\left[1 + v\left(1 - \frac{1}{d}\right)\right]\right\}$$

Total Expenditure $(= Y_{n+2})$

$$E + A + vA\left\{[1 + v]\left[1 - \frac{1}{d}\right] - \frac{1}{d}\left[1 + v\left(1 - \frac{1}{d}\right)\right]\right\}$$

Total Expenditure — Total Cost $(= \Delta Y_{n+2})$

$$vA\left\{v\left[1 - \frac{1}{d}\right] - \frac{1}{d}\left[1 + v\left(1 - \frac{1}{d}\right)\right]\right\}$$

These figures do not agree with Professor Hicks' calculations. According to Professor Hicks, if $s = 0$,

$$Y_{n+1} = E + A(1 + v),\ \Delta Y_{n+1} = vA$$
$$Y_{n+2} = E + A[(1 + v^2) - v],\ \Delta Y_{n+2} = v^2A$$

The problem may be put thus : if in period $n + 1$, new equipment to the value of vA is installed, why does the "expenditure-minus-cost" analysis show an increase in income for that period of only $vA\left(1 - \frac{1}{d}\right)$? How has $\frac{v}{d}A$ "disappeared"?

Now, $\frac{v}{d}A$ will be retained by entrepreneurs—and not paid out as disposable income—if the proper periodic depreciation charge is made against the new equipment. The expenditure-minus-cost analysis assumes that this charge is made ; it appears in the cost line of the table, and the question therefore arises whether this is a proper assumption to make.

To support the contention that the assumption is proper, even necessary, it must be shown that its omission leads to serious error. The "reduction" in income caused by putting aside depreciation allowances is not limited to the period in which they are set aside, nor is their effect temporary, being at an end when they are finally spent. Depreciation allowances if retained by firms for any length of time before being spent on replacing the equipment in respect of which they are charged, affect the whole course of future income.

The difference made to calculations of income created by inclusion of the depreciation factor can be explained by reference to Professor Hicks' "Middle Point." Professor Hicks shows [1]

[1] P. 71.

that with the relations defined by him between income, investment and consumption, the possible courses of future income, subsequent to an initial assumed change, can be divided into a number of types, for which the most important distinction is between continued fluctuations in income which grow progressively larger in amplitude and those which gradually become smaller. The behaviour of these fluctuations can be defined in terms of v. In the static case, if $v > 1$, the fluctuations become larger, if $v < 1$, smaller. Thus $v = 1$ is the "Middle Point," dividing "damped" from "explosive" fluctuations. In Professor Hicks' words, "We now get an inkling of why it is that the point where $v = 1$ (the middle point) is of such importance. For we have now shown that the system cannot run away altogether, so long as $v < 1$." [1]

In Professor Hicks' analysis, if $s = 0$, and an initial unit increase in income is postulated at period n, the course of future income is given by the equation

$$Y_{n+t} = E + 1 + v + v^2 + \ldots\ldots + v^t$$

In the special case in which $v = 1$, there are equal increases in income in succeeding periods until full employment is reached.

According to the expenditure-minus-cost method, the path taken by income when $v = 1$ (and $s = 0$) is not a straight line. Writing k for $\left(1 - \frac{1}{d}\right)$, the increase in income in the first few periods after a unit increase in income in period n are : [2]

$$\Delta Y_{n+1} = vk$$

$$\Delta Y_{n+2} = v^2k^2 - \frac{v}{d}$$

$$\Delta Y_{n+3} = v^3k^3 - \frac{v}{d}(vk + 1)$$

$$\Delta Y_{n+4} = v^4k^4 - \frac{v}{d}(v^2k^2 - \frac{v}{d} + vk + 1)$$

$$\Delta Y_t \quad = v\Delta Y_{t-1} - \frac{v}{d}(Y_{t-1} - Y_{t-d})$$

It can easily be seen that if d has a positive value less than infinity, and $v = 1$, successive increases in income will become smaller, and sooner or later become negative. The lower the value of d, the sooner the downturn will come.

The corollary to this is that, if allowances are made for

[1] P. 74.

[2] I wish to acknowledge my grateful thanks for considerable assistance from Professor C. F. Carter in solving certain mathematical problems.

depreciation, the capital coefficient can be greater than unity without the system becoming explosive. The lower the value of d, the higher the possible non-explosive value of v. That it is extremely difficult to express the highest non-explosive value of v in terms of d can be seen by inspecting the series of income increases given immediately above.

The conclusions suggested by this analysis are :

1. There is no absolute value of v which can be regarded as the middle point.

2. There are no combinations of values of v and d which will, if $s = 0$, cause subsequent increases in income of amount equal to an initial autonomous increase.

3. The higher the value of d, the greater will be the income-creating effect of any given value of v.[1]

4. If $s > 0$ (but <1), the general equation becomes

$$\Delta Y_t = v(1 - s)\Delta Y_{t-1} - \frac{v}{d}(Y_{t-1} - Y_{t-d})$$

and there will be some combinations of v and d which will not be "completely" explosive,[2] although relative to the value of s, v is above the "upper point." For example, $v = 2$, $s = 0{\cdot}10$, but $d = 5$.[3]

What has been said so far applies to the effect of unspent depreciation allowances during the upswing phase of the cycle. The relation between unspent allowances and replacement expenditure actually incurred during the downswing is by no means so clear. Briefly, two cases, each divisible into two sub-cases can be distinguished.

1. When excess capacity develops, and gross investment equals zero.

(a) Entrepreneurs may argue that in these circumstances it is not necessary to put aside any depreciation allowances. In this case gross investment = unspent depreciation allowances = 0 (no depreciation allowances effect).

[1] For a discussion of the effect on income of depreciation allowances see Keynes, *General Theory*, Ch. 8, Part IV.

[2] Professor Hicks defines (pp. 71–2) the course of income as completely explosive if v is so large that even when $s > 0$, an initial increase in income causes successive increases of progressively larger size. There is no downturn.

[3] Whether a whole series of cycles can be regarded as damped or explosive depends not only on the values of s and v, but also on the assumption that the course of the downswing can be regarded as symmetrical with the course of the upswing. Under this assumption, it seems probable that if the factor d is included, for some values of v, s and d, (when v is not much greater than unity) completely explosive cycles will be converted into damped cycles.

(*b*) On the other hand, it may be argued that even when gross investment is zero, it is desirable to make some (even if reduced) current allowance. In this case the rate of decline in income is accelerated.

2. When gross investment is positive (no excess capacity).

(*a*) It is most probable that if allowances are made against the full amount of capital employed, allowances will be greater than replacement expenditure. If this is so the rate of decline in income will be accelerated.

(*b*) It is possible, however, that allowances currently made will be reduced and be less than replacement expenditure. If this is so, the rate of decline in income will be arrested, and, even, as a limiting case delayed.

Of these possibilities, 1*b* and 2*a* seem the most probable, and it is interesting to notice that in these (most probable) cases, the downswing is faster than the upswing. The limiting case of 2*b* contrasts with the usual general assumption that net investment becomes positive and creates income only after the downswing has ended and after income has been at the lower limit for some time.

As has been said above, nothing definite can be stated about the downswing—there are too many possibilities. This note is primarily concerned to show that in the upswing, the setting aside of depreciation allowances acts as a mechanical factor reducing the effective value of the capital coefficient as a creator of income.

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REVIEWS

Econometrics. By JAN TINBERGEN. (London : Allen and Unwin, 1951. Pp. xii + 258. 36*s*.)

Econometrics. By GERHARD TINTNER. (New York : John Wiley (London : Chapman and Hall), 1952. Pp. xiii + 370. 46*s*.)

THOSE who attempt to teach econometrics, or to use econometric methods, will be glad of the appearance of these two books, for it has been difficult to know where to turn for an up-to-date and systematic treatment of the subject. Far too much has to be disinterred from the mathematical journals or from *Econometrica*, and the journal articles are often exceedingly obscure and ill-expressed. The result has been that a student with (say) two years' mathematics behind him has needed unusual persistence to be able to make anything of the subject; while the research worker has had to cling to out-of-date methods because he could not face the effort needed to assimilate new and better ones.

Furthermore, the two books are complementary and not competitive. The first is a revised and enlarged translation of Professor Tinbergen's Dutch text of 1941. It is a first introduction to the subject, inadequate as a guide in actual research, but valuable as a means of getting the main ideas and the logical structure of the subject into the mind of a beginner. Economic knowledge is presupposed, but "no more mathematics than some elementary secondary-school algebra and some knowledge of graphical presentation." Professor Tintner's book, on the other hand, assumes for most of its chapters "some familiarity with the elements of the calculus and mathematical statistics"—which is an understatement. It is an encyclopædia, enumerating one by one the principal methods in use, and giving for each an illustration of its application.

This might seem an ideal combination—the first book acting as the student's first introduction, the second behind the scenes as the foundation for his teacher's erudite lectures or as the handbook to which the research worker can turn. But the two still leave an important gap unfilled; there is no econometric analogue of Kendall's *Advanced Theory of Statistics*—a systematic text-book which not only introduces the important methods, but also sets them in their place with elegant proofs of the theorems required. Professor Tintner leaves too much unproved; his book is the

ideal source for the man who wants a full bag of tools, but does not care to know how they do their work. The fuller task would take more than one volume, but it needs doing if this difficult science is to be intelligently used.

Professor Tinbergen first introduces the idea of putting an economic theory in mathematical form—the choice of the model; and he then outlines a selection of the statistical methods which can be used to test the model. Next he gives illustrations of the way in which econometric methods have been used—*e.g.*, to determine demand functions, elasticities of substitution, or production functions, or to test models of the business cycle. Finally, he draws on his own unrivalled knowledge to present a simple model of the working of the Netherlands economy, illustrating the use of econometric research for the determination of economic policy. An appendix reprints three articles on allied subjects (including a valuable one from *Ekonomisk Tidskrift*, 1947, on the use of correlation analysis in economic research). There follows a bibliography of laughable brevity, which bears eloquent witness to the need for the book.

All this is presented in a style which, having regard to the difficulties of translation, is clear and economical; one feels that the writer remembered the limitations of his audience as he wrote each paragraph. The result is (subject to a qualification to be made below) a good, well-rounded book. The trouble is that it stops so soon—almost before one has got far enough up the foothills to get a fair view of the mountains piled up ahead by the industry of the contributors to *Econometrica*.

Professor Tintner's mastery of the subject appears in every page—not least in the way in which he can illustrate much of it by reference to his own work. No one can complain of the shortness of his bibliography; it is indeed difficult to find anyone appropriate who is omitted from his Index of Names, and he cannot even mention the Multiplier (p. 67) without appropriate references to Kahn, Keynes, Clark, Machlup and Ullmo. At first this addiction to footnotes is irritating, but in the later parts of the book it proves its merit; for here we have presented, one after another, the econometric methods and problems—each with enough explanation to give a clear mathematical formulation, and with those invaluable footnotes to take one to the original sources.

The book is divided into three parts; the first, a non-technical introduction (with a little statistical theory thrown in, and some illustrations of the use of econometric methods); the second, an

introduction to multivariate analysis; and the third dealing with the difficult problems of time series analysis. There are two valuable appendices, one giving elements of the theory of matrices and determinants, and the other some methods of numerical computation. Some subjects (*e.g.*, input–output models) seem to get a surprisingly brief treatment; but it would be difficult to find anything of tested importance which is not at least mentioned. As a work of reference, Tintner's book will be invaluable for many years to come.

One hesitation remains, which applies to both books. The difficulty of econometrics often lies in the judgment required in using methods on data to which they are not quite suited; a frequent example is the use of tests of significance assuming normality on non-normal data. The most important lesson to be learnt by the budding econometrician is the need for presenting his results honestly, with the necessary qualifications and doubts attached to them. Would he, brought up on Tinbergen and Tintner, have this proper humility about the results of his labours? It is difficult to convict either author of definite errors in the conclusions drawn, but I suspect that both give an impression of the precision and relevance of *present* econometric methods—and of their usefulness to the policy-maker—which is not really justified. Those of us with hunches can go on using them for a while yet.

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Conference on Business Cycles. Held under the auspices of Universities–National Bureau Committee for Economic Research. (New York: National Bureau of Economic Research, 1951. Pp. xii + 433. $6.)

THIS volume contains eleven papers presented at the Conference on Business Cycles held in New York at the end of 1949, together with comments on each of the papers by those participating in the discussion. Most of the papers are empirical or deal with methods of empirical business cycle research, and they give a good cross-section of the work currently being done in the United States in this field. Considerations of space require comment to be confined to the three most substantial contributions, those of C. Christ, R. A. Gordon and L. R. Klein.

The purpose of Dr. Christ's notable paper is to revise those parts of Dr. Klein's sixteen-equation econometric model of busi-

ness cycles in the United States 1921–41 which fit post-war data least well, and then to test the revised model by comparison with a further post-war year, 1948. The first part of this test is to investigate whether the application of the revised equations to 1948 leads to results as close to reality as was to be expected from the unexplained variation in the years for which the model was constructed. The model survives this part of the test well. But the second part of the test puts the matter in a different light. The " prediction " of the model for 1948 is compared with the predictions that would have followed from what are dignified with the name of " naïve models," to wit, first, the assumption that all magnitudes remain the same as in the previous year, and secondly, the assumption that all magnitudes change by as much and in the same direction as in the previous year. It is found that on the average over all equations the predictions of the sixteen-equation model are no better than those which would have resulted from the naïve models.

Devastating as this result may appear, it would be premature to conclude that either the Klein model or the simultaneous-equation method which it exemplifies are useless for purposes of prediction. A test on the basis of a single year is necessarily indecisive, and there are certain objections to Dr. Christ's handling of the statistics which Dr. Klein points out in a rejoinder. For these reasons the paper is perhaps valuable chiefly as an exercise in method. But most readers will probably feel none the less that it goes a long way to support the view expressed by Milton Friedman in an accompanying comment, that the complexity of dynamic processes is too great for there to be much prospect of successfully reducing them to a simultaneous-equation model in the present state of our knowledge.

Dr. Klein's own contribution to the present volume is devoted mainly to a multiple-correlation analysis of railroad investment in the United States 1922–41. As is to be expected, it is a well-executed and clearly written specimen of this type of work, and deserves attention especially for the use it makes of cross-section data relating to individual railroads. It is uncertain, however, whether it will succeed in converting those who, following Keynes, are sceptical as to whether multiple-correlation methods of this type can as a rule yield any much more reliable and valuable results than can be inferred by mere inspection combined with *a priori* reasoning. The firmest and chief conclusion arrived at is that investment in railroads varied with profits, the other coefficients in the equations being mostly subject to substantial varia-

tion in size and even in sign according to the number of variables included in the reckoning—while at the same time being not necessarily statistically non-significant in any particular equation. The results cannot therefore be said to be particularly startling. Doubts may be felt, moreover, about the use of the variable K (stock of fixed capital in track and equipment in real terms), which enters into almost all the equations and has an important bearing on the results. The author starts from the *a priori* supposition that the higher the value of K the less will be the incentive to undertake expansion at any given level of profits, and this he finds to be confirmed by his calculations for the industry as a whole. Year-to-year variations in K are not large, and the principal effect of introducing it as a variable is to "explain" the relative stability of investment in the 1920s, when profits were rising but the stock of capital was rising too. (During the 1930s changes in K were small.) A further important point is that if K is not included as a variable, the coefficient attached to the rate of interest is found to be positive, and this Dr. Klein rejects as absurd.

Now the question naturally arises whether the same reasoning would not require account to be taken of the growth of capital capacity in road transport, which undoubtedly operated to discourage investment in railways no less than did capital accumulation within the industry itself. No measure of road competition is included among Dr. Klein's variables, and it would be interesting to know what would be the effect on the coefficients of the other variables if it had been. It is possible, of course, that Dr. Klein tried including some measure of road competition and found the result statistically unsatisfactory; but this is not sufficient justification for ignoring it if it is agreed that *a priori* reasoning demands its inclusion. It could be argued that the effect of road competition is already adequately reflected in railway profits; but, on the same reckoning, so would be the effect of the pressure exerted by increased capacity within the industry. An attempt might alternatively be made to justify the introduction of K as a variable, unaccompanied by any measure of capacity in road transport, along rather different lines, as providing the corrective necessary to transform the figure for aggregate profits into one for profit rates per unit of invested capital; but this is clearly not what Klein has in mind, and is, moreover, subject to the objection that in the cross-section study the coefficient of K (in this context calculated for the individual railroads severally) is found to be much smaller and less reliable than it is in the equations relating

to the industry taken as a whole. This is the opposite of the result to be expected if profit rate per unit of invested capital rather than aggregate profit is the relevant variable.

To the present reviewer the most interesting of the papers is Professor Gordon's on the Investment Boom of the Twenties. This is an essay in the " quantitative-historical " method which Professor Gordon described in a noteworthy contribution to the 1949 *Proceedings* number of the *American Economic Review*. This method is an eclectic one, characterised *inter alia* by close attention to the cyclical experience of individual sectors of the economy. So great is the wealth of statistical material that unfamiliar results can be obtained by these means even without going much beyond relatively well-known sources.

Detailed criticism of Professor Gordon's findings would be out of place, since his paper represents only a preliminary report on research still in progress. It may be hoped, however, that when the full results are published, Professor Gordon will make his theoretical presuppositions rather more explicit than he does in the present paper. The concepts of over-building and over-expansion, for example, of which he makes much use, stand in need of rather more precise definition, and one would like to know more about his views on the consumption function. In the meanwhile, however, many interesting facts and ideas emerge. Professor Gordon's tentative summing-up is that " the investment boom of the twenties resulted from a concentrated flowering of investment opportunities, created by the rapid maturing of a series of new industries and new services," with the housing boom partly related to these and partly an independent phenomenon. He points out the importance of the increase in employment and investment in commerce and the service industries, as well as in the more obviously innovatory automobile and electrical industries and their ancillaries. The importance of construction in the inter-war cyclical pattern stands out anew : more than 85% of the extent to which gross capital formation in 1936–39 fell short of its level in 1926–29 was accounted for by the decline in construction. The final upward spurt in business in 1928–29—in which inventory investment played a large part—is viewed by Professor Gordon as anomalous and in need of further study, since by that time many of the forces which had contributed most to the high level of investment earlier in the decade were largely spent.

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Aufsätze zur Ökonomischen Theorie. By J. A. SCHUMPETER. (Tübigen : J. C. B. Mohr, 1952. Pp. 608. DM. 38.50.)

THIS massive volume is the first of three in which Schumpeter's two former colleagues at Bonn, Professors Spiethoff and Schneider, are collecting his more important shorter German writings, concentrating particularly on those subjects not treated in his main books. Two further collections on Sociology, and on Biography and the History of Thought, are to follow shortly.

The essays here, ranging in date from 1906 to 1932, are grouped under the six headings of The Theory of Money and Credit, Distribution, Interest, Socialism, Methodology and the Study of Economics. Dominating the first section is the long essay on " The Social Product and the Unit of Account " (1917) in which so many of the leading ideas on monetary theory of the first half of this century receive one of their relatively most early and most stimulating presentations, for example, such ideas as " the income approach," its compatibility with the quantity approach, the process of forced saving, and the monetary over-investment analysis of crises.

The three essays on Distribution are concerned with theories of rent, imputation and marginal productivity, which subjects, however, like so much else, take on fresh life and relevance through Schumpeter's treatment—particularly here in his paper on " The Fundamental Principle of Distribution Theory " (1916). His theme of the often false antithesis set up between the marginal-productivity analysis of distribution, and contrasted explanations in terms of social power, exploitation, and the like, is somewhat similar to that of Professor D. H. Robertson's well-known paper on Wage Grumbles. Schumpeter took as his example of the irrelevant criticism of marginal productivity the essay of the revisionist-Marxist Tugan-Baranovsky on " The Social Theory of Distribution," with its somewhat vague appeal to the power factor. Schumpeter concludes that the proposition that economic life is determined by " social power," and the proposition that it is determined by " inevitable economic relationships " (*i.e.*, the maximising formulæ of the marginal productivity doctrine) are perfectly compatible,—because the latter have little content.

Next comes Schumpeter's side of one of those interminable Böhm-Bawerkian, and often rather " essentialist " controversies, presented in his paper on " A Dynamic Theory of Interest." This was in answer to Böhm-Bawerk's criticism of the doctrine of interest stated in " The Theory of Economic Development " (1912) to the effect that interest is " essentially a dynamic pheno-

menon." Here it must be admitted that—for one reader at any rate—there is a theme which even Schumpeter's treatment has difficulty in fully bringing to life again, though this is probably more the fault of his opponent than of Schumpeter himself. But as an example of the intellectual character and manner of much neo-classical theorising and controversy, the paper retains interest.

The two papers on Socialism are entitled " Socialist Possibilities Today " (1920), and " Socialism as it is in England and as it is Here " (in Austria, 1924). The former article contains many of the themes eventually developed in " Capitalism, Socialism and Democracy," and it is tempting to quote from its typical predictions and generalisations. The latter paper seems to attribute what to-day appears a somewhat excessive significance to Macdonald's first minority Labour Government of 1924, but it contains comparisons still of much interest between the Social Democratic ideas and parties of Central Europe and the British Labour Party.

Of the two methodological articles, one is on " The Mathematical Method in Theoretical Economics," and the second is a short, and, for Schumpeter, very sharp attack on a work on " The Positive Method in Economics," by the French positivist sociologist F. Simiand. The article on " The Mathematical Method " was Schumpeter's first major article on economics, written at the age of twenty-two, and distinguished by the enthusiasm, wide learning and, above all, really independent thinking which was to mark his work for the next forty-four years. Vienna in 1906 was, as it remained for long after down till the time of Professors Mayer and Mises, about the last stronghold not simply of *non*- but of *anti*-mathematical economic theorising. The one independent Viennese contribution to mathematical economic theory, in which so much of modern price theory is first precisely stated, was the remarkably original " Investigations " of Auspitz and Lieben. These had been summarily condemned for their alleged methodological errors by Carl Menger himself. It was certainly, therefore, talking out of turn for the youthful Schumpeter to urge the usefulness of mathematical methods of formulation and to pay enthusiastic tributes not only to Auspitz and Lieben, but also to Jevons, Walras and Edgeworth, whose work he claimed to be unduly neglected in Austria and Germany.

Much of the final section is concerned with the place of economics in the examinations for which German students are preparing. But the volume concludes with a specially interesting item, the last in date, in Schumpeter's Farewell Address to the

Faculty at Bonn in that—for Germany and all of us—so fateful summer of 1932. This is a most outspoken paper, notably on the current political position in Germany, and it is hitherto unpublished. However, being based simply on the notes of two students, however trustworthy, and not revised by Schumpeter himself, it is doubtful how far it can be used in evidence. But it may be that one can glean more about Schumpeter's central intellectual tenets from this document than from any other available source.

These German volumes may be especially welcomed because the spirit of Schumpeter's work, which shows up throughout, may be said to be the diametric counter to that which has done much to hamper and distract the progress of the subject, especially in Germany and Austria, for so many decades.

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London.

Schumpeter, Social Scientist. Edited by SEYMOUR E. HARRIS. (Cambridge, Mass.: Harvard University Press, 1951 (London: Geoffrey Cumberlege, 1952). Pp. x + 142. 25*s.*)

WHERE will Schumpeter stand a hundred years hence in the longer perspective of the growth of economics? I suspect that in retrospect he will prove to be a more commanding figure than he was among his own contemporaries. For it may well turn out (my own view is that it will) that Schumpeter was asking the really important and enduring questions about the causes and conditions of economic development, while many of his contemporaries were wrestling unnecessarily with minor issues.

This volume reprints in more attractive and convenient form fifteen essays which first appeared in the *Review of Economics and Statistics* and adds five more from other sources, including Arthur Smithies' memorial from the *American Economic Review* and Gottfried Haberler's from the *Quarterly Journal of Economics.* Here a group of Schumpeter's former colleagues and pupils, including, besides those mentioned, Mason, Chamberlin, Samuelson, Hansen, Marget, Machlup, Stolper, Schneider, Tinbergen, Frisch, Sweezy, von Beckerath, describe and elaborate various aspects of his character and work. What is the picture that emerges? How does it strike one who knew Schumpeter only as an exciting visitor to the other Cambridge and was fascinated and puzzled by those all too brief appearances?

First, Schumpeter flowered almost unbelievably early. His

life's work was devoted to the elaboration and verification of a system of economics which he had matured in all its real essentials before the age of thirty. While the various contributors to this volume seek far-fetched explanations of his disregard of their own or other's theories, the simple truth is surely that he accepted other men's ideas as ornament to his own structure but not as fundamental modifications of it.

Second, while he loved to play with other men's intellectual problems, he was secretive about his own. He enjoyed mathematics and econometrics in reason. But a reader is left with the strong feeling that Schumpeter, like Keynes, saw his solution intuitively, and then went on to verify it with the aid of logic, with statistics or with history. He did not feel that need for the help of others in making the first, intuitive, leap. But he used others in the process of verification.

Third, he was dominated by one great problem : the problem of what makes an economy develop. He measured good or bad wholly by that. His picture of the trade cycle grew out of his picture of the expanding economy. His sympathies were with the economists who asked themselves his questions. He had little or no sympathy with those economists who started with static assumptions, and I am left with the impression that he not only underrated but also misunderstood Marshall and the limited extent of Marshall's dependence on such purely static assumptions. His own intellectual debt was greatest in many respects to Marx. For in their different ways they were both concerned with the same issues. And Schumpeter knew his Marx in a way that few of his generation, or for that matter of later generations, have done. He lived in Vienna among a group of socialists, including Bauer and Hilferding, who were soaked in their Marx. It is a curious paradox that this champion of democratic liberalism should have his roots so deeply in the same intellectual soil as the champion of Communism. It is a pity that Professor Harris did not persuade Paul Sweezy to give us an essay on Marx as an influence on Schumpeter's thought. It would have filled a real gap in this volume.

But it would be as wrong to exaggerate as to underestimate that influence. Arthur Smithies and Gottfried Haberler between them give us a lively picture of Schumpeter's background and upbringing. Son of a textile manufacturer who died when he was four. Brought up as an aristocrat when his mother remarried the officer commanding all the Austrian troops in Vienna. A period as fashionable man-about-town in the London of 1907,

culminating in his first unhappy marriage to an English girl. A year or so practising law in Egypt. Then his first post as Professor in Czernowitz, followed by a transfer three years later to Graz, where he remained in name at least until 1921. His brief unsuccessful foray into politics, with some six months of impossible responsibilities as non-political Minister of Finance in the first socialist government of Austria. An equally unhappy period in business. Then in 1924 a return to academic work with the offer of the chair at Bonn, and his final move to Harvard in 1932. One of the powerful influences in Schumpeter's life was the collapse of the world in which he had been brought up, of the culture in which he had flowered, of the values by which he had reckoned good and bad. Schumpeter transplanted badly. And after his second transplanting, to America, it was many years before his roots were down and he began to flower again. And this affected his economics. Where others, whose worlds had survived, found their solutions partly in nationalistic or socialistic terms, Schumpeter, the nation-less wanderer, found his solution in a vigorous and boundary-leaping individualism.

It was Schumpeter's misfortune that two wars not only destroyed his cultural world but also robbed him of his just intellectual rewards. The *Theory of Economic Development* appeared in 1912. Until 1919 there was little chance for it to impinge on a greater world : and by 1919 that greater world was concerned, perhaps over-much, with more immediate and more pedestrian problems. *Business Cycles* appeared in the summer of 1939, and once again by the time that most potential European readers had returned to their books, the problems with which they were wrestling were too often new and different problems. I suspect that outside of Harvard, that book has as yet scarcely begun to exercise its full influence.

It is perhaps inevitable that various contributors have asked themselves how Schumpeter and Keynes affected each other's thought. For they were almost exact contemporaries, and in many ways had much in common. Arthur Smithies devotes a full essay to this question, and several others find it an absorbing issue. The frank answer is that in both cases their thinking almost completely passed the other by. Arthur Smithies finds the explanation of Schumpeter's extreme antipathy to Keynes's thinking in his opinion "that Keynes's influence exacerbated anti-capitalist attitudes and fostered anti-capitalist policies." Keynes, it would seem clear, made little use of Schumpeter's early work, and I would fear that until the appearance of Pro-

fessor Opie's translation in 1934 (when the essentials of the *General Theory* had already been formulated) Schumpeter's work was far less well known in England than it deserved to be. I will admit to great surprise at the violence of Schumpeter's antipathy as here recorded. I saw them together on occasion in England, and there can be no doubt of the interest that Schumpeter always took in the various stages of development of Keynes's ideas as we described them to him.

But would it really have been better if these two great men had been condemned to run an intellectual three-legged race? Each has given us his own vision of the economic system. There will always be the pedants to tell us that neither of them, but some forgotten nonentity, was the first to mention a point of hitherto unrealised importance. There will always be the little men to make synthetic intellectual mixtures out of the immiscible ingredients that the great men have given us. Is it not better to be content with the new impetus that Schumpeter has given to all our thinking, and not fill ourselves with regrets that something may still remain for others to do?

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Committee Decisions with Complementary Valuation. By DUNCAN BLACK and R. A. NEWING. (London : William Hodge, 1952. Pp. vii + 59. 10*s.* 6*d.*)

IN society many decisions are taken not by individuals but collectively by groups, for example the members of an electorate or a committee; yet the preferences of individuals for particular courses of action or particular candidates remain as the raw material from which these decisions are derived. It is clear from a type of literature which has developed in the last few years that in the transition from private to public choice lies a happy hunting ground for those seeking logical problems. In a recently published book, for example, Professor Arrow has inquired whether any method of transition can be devised which will satisfy certain ideal conditions, while in a series of papers published since 1948 Mr. Black has dealt with the relation of social to private choice under certain special assumptions. The present work appears to be intended as a contribution in the same broad direction as Mr. Black's earlier papers.

The work is divided into four sections. In Section 1 it is

assumed that we are dealing with a committee of three persons which has to choose one of a set of motions (or amendments) on the same subject and which reaches its decisions by simple majority voting. In practice it is envisaged that it would vote on them a pair at a time, the winner of any round continuing to be put against other motions until it is either defeated or finally emerges as the decision of the committee. It is assumed that as each new motion appears it finds a definite rank in the scale of a member's valuations and that he votes in accordance with his rankings. The authors proceed to furnish a diagrammatic apparatus for deriving the majority decision, if there is one, from the three complete sets of rankings, and to stipulate the necessary and sufficient conditions for such a majority decision to exist.

The tenor of this section, indeed of the whole book, may become clearer from a simple illustration. Suppose the three members have to choose one of three motions, A, B and C. If they rank the motions respectively in the order ABC, BCA and CAB, it is clear from inspection that a majority decision is impossible: A will beat B, but will lose to C, while C will lose to B, all by majorities of two to one. An impasse is reached. On the other hand, if the rankings were ABC, BCA and CBA, B would clearly be the majority decision, beating both A and C by two to one. In simple specific cases like these inspection of rankings will suffice to tell us whether there is a winning motion, and, if so, which it is. But the diagrams give a general solution which is applicable to any number of motions. Separate constructions are in fact provided for the case where the number of motions is finite and the case where it is infinite.

In Section 2 the discussion is extended to "complementary valuation." It is now assumed that each motion is valued on two aspects. Thus if one part of each of a series of motions specified Naval expenditure, the other part Army expenditure, a members' valuation of any motion will depend on the combination of the two amounts it specifies. For picking the majority decision the technique of Section 1 is shown to be applicable where the number of motions is finite. For the case where it is infinite an ingenious construction using indifference surfaces is provided.

In Section 3 it is assumed that the committee is reaching decisions on two different topics alternately. When a decision has been reached on topic A the members are thought of as putting forward proposals about topic B on the assumption that the A decision will hold good. After a B decision has been reached by majority voting they make new proposals about A on the

assumption that this B decision will hold good; and so on. The object of the section is to discover from the three members' preference surfaces for combinations of A and B "positions of stable equilibrium," *i.e.*, decisions about A and B which once made will not be departed from. Again constructions are given for both the finite and the infinite cases, that for the infinite case employing a most original combination of preference surfaces and cobweb diagrams. The argument of this section is shown to hold good for committees of any size.

The fourth section is a purely technical addendum. It is shown that the diagrammatic results do not depend on the units of measurement used.

The book is very lucidly written and, though technical, should be intelligible to anyone acquainted with indifference surfaces and elementary calculus. A little more might perhaps have been said about the empirical assumptions which are made here and there about the nature of individual preferences. For example, in the part of Section 1 dealing with an infinite series of motions it appears to be assumed that all three members will allot neighbouring or equal ranks to motions neighbouring in the series. This assumption may be reasonable, but it seems to merit discussion.

The book is to be commended as a highly ingenious essay in topology, but it can scarcely be regarded as more. The constructions do not lead to any results which can be interpreted in words : no new propositions emerge about the general relations between private and social choice except at an inescapably mathematical level of abstraction. Mathematical niceties apart, the results are barren.

It may be worth remarking that in practice preferences are not only elicited in the course of committee proceedings but are also often changed. To assume consumers' tastes do not change, as we do in demand theory, is one thing; to assume assessments of various courses of action remain fixed during a session devoted to mutual enlightenment and persuasion is another. Thus the basic assumption of consistent behaviour in accordance with a given preference scale is less "realistic" here than in other contexts. It would be invidious to quibble about the assumptions, however, when one is scarcely tempted to invite the authors to make any new ones.

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L'Interaction des Marchés : La Liaison Horizontale. By MARCEL F. CAPET. (Paris : Armand Colin, 1952. Pp. 6 + 203.)

THIS volume is the third in a series of Studies and Memoirs to be published under the auspices of the *Centre d'Etudes Economiques* founded in 1951 as an organisation to promote economic research in France. The author's object in this study is to provide a unified exposition of " the horizontal interdependence of markets."

A distinction is first drawn between vertical relations between markets—those that arise because one good is used in the production of another at a later stage—and horizontal relations which arise at the same stage in the economic process. The first part of the book deals with the static aspects of interdependence, and has for its subject matter a familiar introduction to marginal analysis. A chapter each is devoted to the consumer and the producer, and the notions of substitution and complementarity are carefully explained at length and suitably qualified. A third chapter deals with the different definitions of substitutes and complements.

The second part of the book gives an exposition of the theory of market mechanisms and price formation. There is a concise and useful exposition of the theories of monopoly, duopoly, monopolistic competition and the like, which leads to some general but not very useful remarks on interdependence. A final chapter mentions some dynamic aspects of price formation.

A feature of this book is its numerous (but not always relevant) references to recent work in the journals. The chapter on the theory of the consumer in the first part is probably the best in the book on account of its references to the substantial number of empirical investigations carried out in the last twenty years. In the opinion of the reviewer the book would have been improved by giving more detailed accounts of these investigations at the expense of the lengthy theoretical analysis elsewhere. There are a number of misprints, especially in the extensive bibliography; the argument in the note on p. 47 is particularly confusing on this count.

The book may be recommended to final-year students interested in advanced economic theory from the Ricardo effect to the problem of integrability.

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Principles of Private and Public Planning. By WILHELM KEILHAU. (London: Allen and Unwin, 1951. Pp. 272. 16*s*.)

WE are all, it seems, "in happy ignorance of the essential fact that all economy is planned" (p. 201). This is the key to Professor Keilhau's book. If only people fully realised that capitalism is not chaos, they would be less easily seduced by central planners.

That we fail to understand this is partly because economists have neglected the fundamental principles of economic planning. This is put down to the influence of philosophic determinism on Ricardians, Marxists and Psychologists; while Adam Smith is excused on the ground that he must have thought it all too self-evident to be worth saying.

Part I, then, is supposed to be concerned with the principles of private planning. It consists of a jumble of the old-fashioned classificatory kind of psychology, a bit of logic and philosophy, and some rather obscure unorthodox economics. The excursions into logic and philosophy are not very happy. Professor Keilhau bravely attacks the problem of universals. His solution bears a rather striking resemblance to that of Locke ("this abstract image is our conception of hunger, of hunger as an abstract and general idea," p. 29); Berkeley's famous refutation of Locke is ignored. Not untypical gleanings from logic and "psychology" are "when the naked quantities of two and two are added together, the result is bound to be the naked quantity of four everywhere in the universe" (p. 37), and "human actions are either unconscious, subconscious, half conscious or conscious" (p. 22). In economics, we learn of the "minimum law," expounded as follows in the chapter on "Capitalism as an Instrument for Economic Planning": "*If the execution of an economic plan requires contributions from a number of factors, and those factors can be combined in a suitable way, the result will, quantitatively expressed, be dependent on that factor whose contributions are comparatively most restricted.*"

If Part I can be said to be about any one thing, it is about words. Professor Keilhau has a passion for definition. Instead of "before" we are told to say "in pretime to" and similarly for "after." Chapter IV yields "Economic are planned activities which create, promote, acquire, preserve, or secure future usefulness as well as planned activities which enable human beings to do economic work or to do it better than before, and planned activities which organise, protect, support, or assist other economic

activities" (p. 42). I take this to mean that it is not an "essential fact" that all economy is planned, but a matter of definition, Keilhau's definition. Our ignorance is happy indeed, but not after all surprising. Definition, however, reaches a climax in Ch. VII, where no fewer than twenty different variants of "value" are pinned down. For better or for worse few survive the operation.

Part II on "Principles and Systems of Public Planning" is easier to describe. It is primarily an attack on "national capitalism," a term used to refer roughly to the 1945–50 economic systems of the United Kingdom, Norway and Sweden. After quite good introductory discussions of socialism, communism, fascism, naziism and liberal ideology, Professor Keilhau rapidly descends to travesty when describing "national capitalism."

National capitalism is linked with mercantilism by the curious statement that "the original as well as the most conspicuous aim of national capitalism is to adjust an adverse balance of payments or to better a positive one" (p. 202). Is it not odd to argue that because, first, the most conspicuous problem facing countries like England or Norway is an adverse balance of payments, and, secondly, these countries have somewhat similar systems (dubbed "national capitalism" by Keilhau), improving foreign balances is the *aim* of such systems? The more plausible claim that these difficulties have arisen partly because full employment has been overinsured is not mentioned (because of course "even a more liberalistic government may adopt a policy aiming at procuring full-employment" (p. 216)). The logic is here strained for the obvious purpose of classifying ourselves, and Norway, as mercantilists; which, he thinks, will hurt. Yet in his "Final Remarks," Keilhau admits that "military economy was dominant in the war years, and left the democratic countries east of the Atlantic in a state which more or less prevented a speedy return to a more liberalistic system with decentralised planning" (p. 268). But why not integrate these conflicting final remarks with the main argument?

Professor Keilhau was president of the Norwegian delegation at the Bretton Woods conference. Yet he can argue that they agreed in condemning the whole policy of varying monetary parities as a means of maintaining internal price stability. Was there not something about "fundamental disequilibria" which might justify changes of parity? It is added that "Article I in the agreement of the International Monetary Fund states that one of the main purposes of the Fund is to 'promote exchange

stability, to maintain orderly exchange arrangements among members, and to avoid competitive exchange depreciation.' It should be stressed that no one more heartily agreed in this statement of purpose than . . . Lord Keynes. Nobody should therefore any longer refer to his authority when they try to defend the combination of stabilised internal prices and varying monetary parities." Is this not rather a mischievous *non-sequitur*?

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Handbuch zur Geschichte der Volkswirtschaftslehre. By WALTER BRAEUER. (Frankfurt am Main: Vittorio Klostermann, 1952. Pp. 224.)

THIS is quite a useful and at the same time a very unscholarly book. It purposes to give in tabloid form a biography, the essential doctrines and a list of publications of all writers who have made important contributions to the theory of political economy from Hesiod to Röpke. Each of these sketches is complemented by a copious bibliography, concerning the author and his works; the more important items being marked by asterisks. These catalogues *non-raisonnés* form the useful part of a book which is a combination of a *Who was Who* in political economy and a bibliography. It is rightly limited to the dead, though it contains a few names of living authors who, with the obvious exception of Pigou, seem to be quite arbitrarily chosen. The work is divided in three parts comprising thirteen groups, arranged in accordance with historical, regional or methodological tenets, though some of them are mere hotch-potch. Even within a particular group there is no sense of order or sequence. The one dedicated to "The Forerunners of the Physiocrats and Mercantilists outside Germany," for example, starts with Sully (1560–1641) and is followed much later by Thomas Morus (1478–1535), who, the author observes, must not be mixed up with the Irish national poet Tom Moore (1779–1852). After Locke come not only Hume, but also Sir William Temple and Sir William Petty. The sub-section dealing with Mercantilism proper does not include Thomas Mun or Sir Josiah Child; they appear among its forerunners, and even Colbert gets only a passing mention in it.

This lack of order and insight is made worse by omissions. Not only Colbert, but also Machievelli, Bacon, Bentham, Carey, Henry George and Bakunin are considered not worthy of a

separate article; nor are Fullarton or Thornton. William Playfair is accorded half a laudatory page, and Senior gets two lines and a half. With the exception of John Bates Clark and Irving Fisher, American authors such as Alexander Hamilton and Charles Jared Ingersoll, to whom List owed a great deal, are conspicuous by their absence. Neither Wesley Mitchell, nor Taussig, nor Richard Ely, who might be called the grandfather of the New Deal, nor Thorstein Veblen are included. In France, neither George Sorel nor George Valois, the economist of the *Action Française*, are even hinted at. In Germany, Max Weber, whose influence for good and bad is very great, is ignored. One could write a voluminous essay on those left out.

The biographies are generally scanty, giving only dates of birth and death, and the summaries of each author's contribution to economic theory are sometimes quite inane. Important and unimportant authors get about the same space; Quesnay is the only one to whom almost a full page is allotted. Of Senior, all we are told in two and a half lines, is " that he was commissioned by the textile manufacturers of Manchester to try and prevent the bill for reducing the working day to ten hours from becoming law."

The author has evidently taken some trouble in collecting and abbreviating information available in histories of economic theory, text-books and all sorts of encyclopaedias. His compilation of bibliographies concerning the authors enumerated is valuable. But his hope, that one will be able to pick an author's essential teachings from the extracts quoted by him, is unfounded. He should have looked up Luigi Cossa's *Introduzione allo Studio dell' Economia Politica* before starting on this type of work, and used it as a model to be imitated and amplified.

M. J. Bonn

London.

The House of Baring in American Trade and Finance. By R. W. Hidy. (Cambridge, Mass: Harvard University Press (London: Geoffrey Cumberlege), 1949. Pp. xxiv + 631. 61*s.*)

This book is one of the series of Harvard Studies in Business History, edited by Professors N. S. B. Gras and Henrietta M. Larson. The author's " main source of information about the Barings has been the Baring Papers in the Public Archives of

Canada. . . . Since the business of the Barings prior to the 1850s was mainly with the United States and not the Canadian provinces, the bulk of these early papers is connected with the business and Government of the former country" (p. xxi). But he has supplemented these records with research into other available sources on both sides of the Atlantic.

The first three chapters of the book are given to a preliminary account of the early history of the House of Baring and the personalities concerned in it. The more detailed story begins in 1828. It is built up on the actual transactions and illustrated from the correspondence with the numerous merchants and bankers with whom the firm had business relations. The notes and references appended to the 480 pages of narrative run to 130 pages.

The author has made good use of his material, and the story he has to tell is full of interest. He has much to say of the credit machinery that was being evolved. The typical acceptance credit, granted to a purchaser of goods and enabling importers in America to settle by means of sterling bills drawn by the exporters, was already familiar. But in those days of slow communications, exports were often sent "on consignment": the purchaser was to be found only after arrival in the country of sale, and perhaps even the country of sale was only to be determined after the arrival of the goods in England, the consignment being perhaps "to Cowes and a market" (p. 82). There was no purchaser for the exporter to draw on, and the credit was granted to the exporter himself. Much of the business of the highly efficient agent, Thomas Wren Ward, who served the Barings in Boston, consisted in arranging these advances on American exports in the form of bills drawn by exporters on Barings. Dr. Hidy might have added to the value of his book if he had been somewhat more explicit as to the nature of the credits which form the subject of innumerable specific transactions. It is not always possible to say whether the credit is granted to an exporter or to an importer and, if to the latter, who is to draw the bill. And a little more explanation would sometimes have been welcome. Readers cannot be assumed all to know that the rate of exchange was quoted in the form of dollars to £22 10*s*., with parity after 1834 of 109½. And what is the significance of a table which adds "acceptances" to "overdues (including old debts)" to arrive at the total "outstanding obligations of the Barings" (p. 254)?

An interesting side of Dr. Hidy's subject is the business in American securities. Credits were opened with correspondent

bankers for dealings in exchange, and a great part of the business consisted in bills drawn from the United States on Barings to be met out of the proceeds of American securities sent for sale in London. Barings might purchase the securities and then sell them on their own account, or might act as agents in selling them. We are told, however, very little about the actual arrangements for sale, and nothing about the relations of Barings to the Stock Exchange (to which there is only one casual reference, p. 129).

Dr. Hidy has provided us with a very valuable account of the policy of Barings throughout his period (1828–61), particularly of their prudence in face of the big fluctuations in the state of credit and the repeated crises in the thirties. It is interesting to find (p. 217) Barings in 1837 participating in the guarantees which tided over the embarrassed acceptors of American bills (Timothy Wiggin and others), making a precedent for the joint guarantee which rescued Barings themselves from failure in 1890. And some details not previously available are given of the credits raised in 1839 in Paris through the instrumentality of Barings in favour of the Bank of England (pp. 275–6). Much of the success and the resulting power of Barings depended on their judgment of persons. In this the knowledge and perspicacity of the partners in London were well supported by their agent, Ward, in America.

They prescribed rules for themselves, not strictly without exceptions. A client must not have a second account with another London merchant banker. They held bills receivable till maturity, and never rediscounted. At moments of crisis they did occasionally borrow from Overend and Gurney, but avoided using bills as collateral.

Barings were gravely troubled by the American State defaults and repudiations which began in 1841, not so much on account of the threatened loss to themselves as of the shock to American credit. Dr. Hidy gives a detailed account of their contribution to the campaign which eventuated in the resumption of payment and the discharge of their obligations by Pennsylvania, Maryland and Illinois. Partial success was also achieved in Louisiana. In the States which finally adhered to repudiation Barings had very little direct interest.

Dr. Hidy carries his history down to the crisis of 1857 and the outbreak of the Civil War in 1861. It is of interest to learn that in December 1860 "Thomas Baring received from Lord John Russell a polite negative to his suggestion that the British Government should act as mediator in the quarrel between North and South."

The opening up of the records of one of the great merchant banking houses offers a great opportunity for the economic historian, and Dr. Hidy has made very good use of it.

R. G. HAWTREY

London.

The Sterling Area. By A. R. CONAN. (London: Macmillan, 1952. Pp. v + 192. 16*s*.)

THIS book is a notable study of a subject which has been (surprisingly) neglected, and provides a valuable groundwork for discussions of sterling area problems and policies. It sets out to be "a factual study of the sterling area," not to discuss the many important questions which may (and should) be asked about the nature of the area and the directions in which it should evolve. It collates the essential data upon the balances of payments in the sterling countries and sets them out in a manner which displays clearly the most important changes that have occurred.

Detailed balance of payments figures for the post-war period are given for each of the independent sterling countries; similarly detailed data for some of the more important individual colonies would have been useful, in view of their strategic position in the fight for solvency of the area as a whole. In the absence of official balance of payments figures for the colonial territories, Mr. Conan has been abliged to make his own estimates, which he has done by totalling the published trade figures for the whole group and adding to them his own guesses of invisible transactions for the whole group. But the experience of individual colonies has been widely different from the average of them all, and cannot be judged without individual balance of payments estimates. It is a pity (for which Mr. Conan is in no way to blame) that a certain amount of obscurity is inevitable unless one is prepared for bold guesswork. For the trade figures alone are no sufficient indication of what has happened.

It is pointed out that the releases of sterling balances to sterling countries in the East during the years 1946–49 cannot be held responsible for the United Kingdom's surplus with the rest of the area during those years. Mr. Conan shows that the United Kingdom's trade surpluses in these years were incurred mainly with sterling countries other than those in the East. But it does not seem quite true to state (as he does) that during the years 1947–49 the trade of the United Kingdom with the countries in question (India, Pakistan and Ceylon) "on the whole nearly balanced." The figures given by Mr. Conan are those in the

United Kingdom trade returns, which value imports " c.i.f." and therefore underestimate any visible surplus; had he taken the figures given in the trade returns of the overseas countries concerned, the visible balance would have been more in the United Kingdom's favour (taking the three years as a whole) : if a visible balance is struck by taking the (f.o.b.) figures given for exports by each country the balance runs strongly in favour of the United Kingdom. It seems likely that the charges for freight and insurance upon this trade would accrue predominantly to the United Kingdom. And such evidence as is available about other invisible transactions makes it appear likely that the total current-account balance would show an even larger surplus in favour of the United Kingdom in her transactions with these countries.

But even this figure would be only a fraction of the total releases of sterling balances to these countries during these years, and Mr. Conan is right to stress that a large part of them were used to pay for goods from other overseas sterling countries and from outside the area. But this does not alter the fact that the releases were responsible for rather more of the United Kingdom's surplus with the rest of the area than Mr. Conan seems willing to attribute to them : for, so far as they were used to buy goods from other overseas sterling countries, they led to increases in these other members' sterling balances and ultimately, therefore, in their demands for United Kingdom exports.

Some exaggerated statements made in recent years about the loss of United Kingdom investments during the war are here controverted effectively. The annual net investment income of the United Kingdom (in money terms) has not been much smaller than before the war, and that from shipping has been larger. The invisible item most responsible for adverse changes has been Government overseas expenditure. The main causes of the deterioration in the United Kingdom's position have, then, been the fall in the value of money and the adverse turn of the terms of trade. Similar factors have caused important changes in the debtor–creditor positions of the individual sterling countries; as the United Kingdom has reduced her creditor status the overseas members have reduced their net debtor positions. Estimates are given of the United Kingdom's overseas investments, which constitute an interesting supplement to the figures published by the Bank of England; Mr. Conan's figures attempt to cover a wider field than those of the Bank and to estimate market values (as compared with nominal values given in the Bank of England figures). The conclusion reached is that, though the

United Kingdom is on balance a net debtor to the rest of the world, the consequent net payments of interest should not prove unduly burdensome to her economy.

The chapter devoted to exchange-rate problems summarises the main motives for the exchange-rate adjustments made by different sterling countries in recent years; the comparisons of the policies of different members are illuminating and throw light on the nature of the trade bonds holding the sterling system together.

The mechanism of control of the sterling area is considered in some detail; like the other chapters of the book, this section collates material from diverse sources which it is helpful to have in one place and in a more widely available form than the official sources from which it is derived. Mr. Conan shows the unsatisfactory nature of the attempts so far (that is, up to 1951) made to co-ordinate the policies of the sterling area countries. Although he does not make suggestions for improving the system, he has done a service by emphasising the need to find solutions and to increase the general awareness of the problems involved. To this latter task his book is a valuable contribution.

J. O. N. PERKINS

Cambridge.

Money and Employment in Ireland. By LAWRENCE HOOPER. (Dublin: C. J. Fallon, 1952. Pp. xii + 159. 10*s.* 6*d.*)

THIS is a most ingenious book (although the reader must be warned that it deals, not with Ireland, but with the Irish Republic). Roughly half the work is taken up with the construction of fifteen hypothetical models of successive degrees of complexity, and the rest with the application of these models to recent statistical material relating to the Irish Republic.

As a dogmatic and logical exercise it is excellent, but, when one brings it into relation with reality, doubts creep in. To begin with a small point, it seems to over-emphasise the peculiarities (from a Keynesian point of view) of the Republic's economy—in fact, on every score mentioned, it is the Keynes–Hansen economy which is peculiar (in its possession of a centralised, effective and exclusive monetary control), and the Republic's economy is only one of a class which was always numerous and is now being made much more numerous by the current disintegration of the free world's economic organisation. The two essential peculiarities of the Republic's position are, first, that its government funds,

banks and private residents possess large reserves of sterling securities, arising largely from the luck of two World Wars; and second that economic disintegration has not yet shut it out completely from the larger market of which it previously formed a small but important part.

In spite of the author's early disclaimer, the book is in effect a plea for the liquidation, by the technique of Exchequer borrowing from the banks, of whatever portion of these "Foreign" assets may be necessary, in order to induce "full employment" in the Republic and stop emigration (pp. 67–70). Within the limits of a somewhat naïvely optimistic Keynesian orthodoxy (*e.g.*, "most countries now make full employment the primary aim of their economic policies which in general are based on the Keynesian analysis and which in general are successful," p. 3), which may be excused by the fact that the work was completed in September 1950, the structure is sound and the analysis of the existing economic structure of the Republic acute and valuable.

It is when one reflects on what is omitted or glossed over that one begins to feel doubts about the easy way out. No doubt everybody in the neighbourhood can have a good and exhilarating time while somebody's accumulated assets are being blued, but—What about the servicing of the increasing burden of public debt (since "public works" do not necessarily produce either the requisite public or private income)? Is not the probability of local inflation underestimated, in view of our recent experience? What answer is there to the loss of import-purchasing power represented by every liquidation of "foreign" assets, particularly if accompanied by an internal inflation of wage-costs, as recent experience exemplifies? Is the expressed faith in the operation of the "multiplier" too simple, especially in view of the Republican peculiarities which are stressed? Would it be easy to induce the present holders of "foreign assets, who hold them for good reasons of their own, to substitute therefore *ad lib.* securities of the Republican government? If not, what then? Does it follow that the achievement of "full employment" in the Republic would check emigration?

It is one of the merits of the book that, while its strict though limited apparatus leads to one deceptively simple prescription of policy, the presence of more subtle problems is always apparent.

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Monetary Theory and Public Policy. By K. K. KURIHARA. (London : Allen and Unwin, 1951. Pp. xiv + 393. 30*s*.)

DR. KURIHARA says in his Preface that " this volume is an attempt to present in systematic form the latest developments in monetary theory and the implications of such developments for public policy " ; and that " it also attempts to fill the gap between the esoteric literature and the standard text." The term " monetary " is used in its wider sense, and most of the book is devoted to an exposition of Keynesian economics and to a discussion of the ways in which inflation and deflation can be avoided or controlled. Part I contains a chapter on the quantity theory, another on " the creation and destruction of money " and two chapters on inflation. Part II, which takes up about half the book, gives an account of the theory of interest and the theory of effective demand, and goes on to discuss the problems of devising and putting into practice a full-employment policy. In the last section we are taken on a rapid conducted tour of the gold standard, the purchasing-power-parity theory, variable exchange rates and the effects of devaluation, the Fund and the Bank, and some aspects of long-term foreign investment.

In general, Dr. Kurihara is lucid and straightforward when presenting theoretical arguments, and in dealing with issues of policy he is admirably fair-minded and detailed. In spite of these great virtues, however, the book as a whole is rather disappointing. Perhaps its most obvious defect is that the order in which the earlier chapters are placed is quite inexplicably perverse. Although (to quote again from the Preface) " inflation is discussed in terms of modern monetary theory rather than in terms of the traditional quantity theory," the two chapters on inflation *precede* the chapters on the theory of income determination. The " inflationary gap " is defined at the beginning of Chapter 3, while we have to wait until Chapters 9–11 for an account of national income and expenditure, savings and investment and the consumption function. Again, the phrase " gross national product " is introduced without comment on p. 42, and then laboriously explained to the reader in pp. 145–50. Since the book does not claim to be an introduction to its subject-matter, this procedure is not wholly indefensible; but it has no obvious advantage, and breaks the whole continuity of the argument.

Secondly, the book contains an alarming number of statements which are questionable, misleading or actually wrong. Some of the most striking instances may be cited. We are told that

" an export surplus in conditions of full employment is doubly inflationary, since it increases domestic income on the one hand and decreases domestic supplies on the other " (pp. 51–2); and that the size of the devaluation required to restore a country's balance of payments " depends on (*a*) the degree and duration of disequilibrium, and (*b*) *the marginal propensity to import* " (p. 331, reviewer's italics). In the section on the dollar shortage it is asserted (p. 365) that one important reason for the shortage is that " the marginal propensity to import is much higher elsewhere than in the United States, indicating that a given increase in foreign income tends to stimulate American exports more than a similar increase in American income does foreign exports. *In other words, the initial American expansion of imports, while causing a multiple expansion of foreign income, also causes others to increase their expenditures for American goods and services beyond the initial increase in American expenditures for foreign goods and services* " (my italics again). Again, concerning general wage-reductions and their effect on employment, Dr. Kurihara adopts the conventional Keynesian point of view, which hardly prepares the reader for his later contention when dealing (p. 279) with wage *increases*, that " given the short-run constancy of productivity, labour would simply price itself out of the market if it demanded higher money wages." The account on p. 115 of the " loanable funds " approach to the theory of interest may cause some readers even greater perplexity. And even those who are least in sympathy with Dr. Little's views may find it hard to share the faith in our science implicit in the statement, made on p. 294, that " the extent to which income should be redistributed toward equality " depends, among other things, on " the further development of welfare economics " !

Finally, a more general criticism may be made. Although the book is not designed as an introductory text, much of the treatment—both of theoretical and practical issues—is on so elementary a level that an intelligent student who already knows his text-books is unlikely to derive much stimulus from it. Different students react in different ways, and it is unwise to be dogmatic; but one suspects that most of them will find it more interesting and more profitable to read some of the " esoteric literature," instead of turning to *Monetary Theory and Public Policy* for a predigested version of it.

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Price Indexes and Quality Changes. By ERLAND VON HOFSTEN. (Stockholm: Bokförlaget Forum AB (London: Allen and Unwin), 1952. Pp. 136. 26*s*.)

IT is very difficult to sum up in a few words the general impression that this book makes upon the reader. The problem with which it deals is clearly stated, and there is an altogether admirable summary (Chapter I) of the existing state of index-number theory, both statistical and economic. Each step in the argument, taken on its own, is clearly presented, and yet the reader continually finds himself losing the general drift of the analysis. It seems that the author has failed to indicate at any point the rough outline of his method of approach and has also omitted to take stock of the position, to which his argument has so far led him, at suitable breathing stops in the text. Even when we emerge from the jungle conscious of having trod religiously in his footsteps, we do not find him there to explain the purpose of our journey. Instead, he has vanished into thin air, without leaving even a summary of his conclusions, and we are left to turn over the pages once again in an effort to establish where it is we have actually arrived. This failure to lead the reader gently and firmly by the hand while whispering words of encouragement in his ear prevents this book from fulfilling its earlier and remarkable promise.

Mr. von Hofsten as head of the statistical section of the Social Welfare Board, which is responsible for the Swedish cost-of-living index, became aware that there were notable differences in the American and Swedish treatments of the vexed problem of quality changes. Since these variations in practice were sufficient significantly to affect the result of index-number computations, he decided to investigate the matter.

The problem of allowing for quality changes in the calculation of price indices is by no means a trivial one. As Mr. von Hofsten points out, a great many price changes to-day are implicit rather than explicit, and come about only by the substitution of a new model of an article for an old one. The more accurately a good is defined in order to avoid improvement in quality merely being interpreted as an unchanged price, so the more often will the definitions be found to be out of date because no article now on the market conforms to them.

Even the use of rather broad definitions, as favoured in Sweden, does not evade the problem. Should price comparisons be made between only identical goods in succeeding periods or should

averages of the prices of any articles (fulfilling the specification) chosen by price-collecting agents be compared? If the former practice is used, prices will frequently have to be spliced on the assumption that the price ratio of two varieties exactly reflect differences in quality, in default of any information on the subject. Even the latter procedure will involve splicing when definitions become inappropriate. Neither course of action is very satisfactory, and the extent to which each will produce wrong answers in different circumstances is carefully shown by Mr. von Hofsten.

The subsequent treatment of these problems is first practical and then theoretical. A wealth of information is available on what effect the different practices would have had on the Swedish cost-of-living index between 1946 and 1949. As a result of extensive re-calculations Mr. von Hofsten concludes that the prices collected by agents should be averaged and that no attempt should be made to see that they refer to identical varieties in succeeding periods, although of course the articles priced must conform to the recognised definition. When a specification becomes out of date the prices of the old and the new model should be spliced, provided that there has not been a sudden upset in market conditions. If this condition is not satisfied, an attempt should be made to obtain an objective estimate of the quality change involved, *e.g.*, the change in calorific content in the case of a food item.

The theoretical approach has two stages. The first stage makes use of indifference curves, and is concerned with an indifference defined index. The second stage uses Divisia's concept of an integral index. Owing to the nature of the problem, the indifference approach has to be made geometrically, since the analytical theory of indifference curves has not yet been satisfactorily adapted to deal with problems of non-negativity, *i.e.*, the fact we cannot buy negative quantities of any commodity. The use of two-dimensional geometry rather restricts the scope of the argument, and it may well be that an adaptation of Mr. Houthakker's method set out in *Review of Economic Studies*, June 1952, of specifying commodities more widely and giving them a price, part of which depends on their quality (defined as the unit price under a basic price system) would yield more fruitful results. However, it is shown that relative quality should, in principle and subject to certain qualifications, be measured as the ratio of the prices of two substitutes when the consumer is indifferent to consuming only the one or only the other. Although this is all right in a two-commodity world, Mr. von Hofsten shows that the possibility of substitution between these two commodities and other

goods cannot in general be neglected. He concludes that the bias introduced by such neglect and by the use of Laspreyres's formula will be small for the group index for clothing, but relatively large for the group index of food prices, where a great deal of substitution is possible. In order to allow as much as possible for the effect of quality changes on an all-items price index, the component groups should as far as they can consist of goods which are substitutes for one another but which are not substitutes for the goods in another group. It is clear that such a partition can never be really satisfactorily made, and is quite impossible under a regime of rationing.

The indifference defined price index is not unique, since it can be based either on the indifference level on the eve of a price change or on the level eventually attained. The Divisia integral index is superior at least for inter-temporal comparisons, since its value depends on the course followed by prices and quantities throughout the process of transition from one level of indifference to the other. Mr. von Hofsten shows how the use of an integral index resolves a dilemma which the indifference-defined indices cannot. However, even this index fails to stand up to the tests of common sense, and the assumption of unchanged indifference maps is sternly rejected. Mr. von Hofsten then abandons all attempts to make use of the theory of consumers' behaviour and returns to an objective measure of quality based on a commodity's function as the solution of his problem.

Thus theory and practice appear to have led to much the same conclusions. No doubt this is what the author wishes us to believe, but in fact they have merely shown the impossibility of solving a dynamic problem with a static theory. Perhaps one day the assumption of unchanged tastes or preferences will not be basic to a theory of consumers' behaviour, and we shall instead have a theory of how preferences are developed and changed by experience. Until then the fruitful approach to index numbers will necessarily be pragmatic.

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Problems of Nationalised Industry. Edited by W. R. ROBSON. (London : Allen and Unwin, 1952. Pp. 390. 25*s.*)

Forms of Public Control and Ownership. By E. GOODMAN. (London : Christophers, 1951. Pp. 142. 8*s.* 6*d.*)

The Economic Aspects of Nationalisation in Great Britain. By A. M. DE NEUMAN. (Cambridge : Students' Bookshop, 1952. Pp. 52. 8*s.* 6*d.*)

To a varying degree, each of these books pays homage to the spur of competition as a necessity in an economic system. Messrs. Goodman and de Neuman both assert its importance, whilst Professor Robson stresses the danger of the Transport Commission imposing " unnecessarily high rates upon Road Transport " thus to protect the railways, and he goes further saying " any attempt to ' coordinate ' the supply of prices of gas and electricity should be regarded with great suspicion as a probable plot against the public." Admittedly, Professor Robson is more willing than the others to qualify observations by recognising that there may be other priorities, such as the consideration in this case of gas coal supplies, which must be taken into account. Yet, the problems of the nationalised industries are not basically those of competition and monopoly, important as these may be, but of efficiency in four spheres—efficiency in terms of the cost of the unit produced, efficiency in consumer service, efficiency in labour relations and finally efficiency in attention to the public interest. It is to these that solutions must be found, and a nostalgic adherence to the classical prescription of competition ignores the complexity of the problems and the crudities and social costs of the old system, let alone the many ways which had been devised to prevent competition operating with vigour.

The debates which rage to-day about forms of Parliamentary control, about the means of consumer representation, about measurements of productive efficiency and about labour relations and other matters of industrial organisation show the extent to which this section of our economy, about one-fifth, is being subjected to constant scrutiny. The problems which need solution are the ways in which this scrutiny can be made effective —how can Parliament be strengthened in its review of activities in the public interest by public corporations? How can the Consumer Councils be made more effective in their watchfulness over service to the individual? What are the ways in which efficiency can be measured? Each of these demand a different

level of scrutiny, a different sort of examination, because in each case the priorities are different.

Nationalised industries must be efficient, they may even now be much more efficient than we assume, since every mistake is magnified in the present political battle until an isolated incident becomes a characteristic of behaviour—but not only must these industries be efficient, they must also be seen to be efficient. The problem before economists, statisticians, accountants and students of public administration is to improve and add to the scrutinising machinery, whereby at the different levels efficiency may not only be stimulated but also shown to exist. Something to engender public confidence has to be found to replace a continuously high dividend. At the moment the machinery to do this is not strong enough, nor has the political squabble yet subsided sufficiently to make impartial appraisal possible, and without this confidence will not grow.

These and other problems are surveyed in the symposium which Professor Robson edits. " Edits " does scant justice to Professor Robson, who contributes nearly half the book in the form of an historical introduction, a comparison with French practice in this field and a general conclusion in which he surveys the problems raised by the other contributors. To these, and to the original contributions in the *Political Quarterly* for April–June 1950, are added chapters on Compensation, Organisation, Joint Consultation, Consumer Representation, Public Relations and Scientific Research. On each of these matters the Editor gives his own view and raises some other problems of his own. Such a volume is a reviewer's nightmare, and comment cannot do justice to all the matter therein.

The principal criticism must be that this volume does not take us far enough. It does provide an excellent survey of the problems that exist and gives those problems their appropriate setting. Too often, however, a problem remains in that state, flanked with a review of various proposed solutions. The analysis does not go as deep as one would wish, nor does it wrestle sufficiently with the defects and merits of the proposals made. Nevertheless, this is a valuable and stimulating volume, to be followed, it is hoped, by a series of more detailed studies.

Professor Walker and Mr. Condie have made an interesting study of the methods of compensation. They stress the problems of the burden of risk where capital is entirely in a guaranteed interest stock, which the consumer or community have to bear in the place of the equity shareholder. One might perhaps question

one of their premises that the rule of law includes a safeguard of the legitimate *expectation* of citizens against arbitary disappointments by Government action. The chapter by Mr. Hardern on Public Relations is the weakest in the book, concerning itself to a disproportionate degree with pedestrian suggestions regarding helpfulness of telephone operators and the decorative schemes of public rooms. Mr. Harden is gravely at fault when he suggests that Consumers' Councils can be used as an additional means of issuing information to the Press. Such a practice, which consciously or otherwise, some nationalised industries have adopted, can only result in the consuming public seeing their representatives as part of the corporation—" yes-men " in whom the consumer can have no confidence. Yet confidence in this body is vital if the public at large is to accept this form of representation of their consuming interests. Professor Robson's unconcealed basic approval of this experiment of nationalisation does not inhibit him from criticising the present organisation of the industries and some of their institutional arrangements. He reaffirms his faith in the Administrative Tribunal as a method of scrutinising prices, and is surprised that the other corporations do not have to submit their prices to bodies similar to the Transport Tribunal. Professor Lewis, too, points out that such a tribunal is necessary to ensure that statutory guarantees against price discrimination are in fact carried out. Whilst admitting that this second condition has substantial justification, we can only question whether the Transport Tribunal in practice functions as efficiently as Professor Robson would have us believe. Its lack of sufficient skilled staff, the statutory provisions which already govern the financial deliberations of the B.T.C., rendered the prolonged arguments of its recent hearings an unsatisfactory method of scrutiny. In his conclusion, a statement of faith, Professor Robson affirms that the public corporation is destined to play in the next fifty years as important a role as the joint-stock company played during the last 100 years.

Mr. Goodman, too, is a partial observer—by contrast a Liberal. His work, *Forms of Public Control*, attempts to survey developments since 1840 in this sphere and the working of nationalisation since 1945. It is unfortunate that he included these subjects, already well covered in other works, for this section is too long and too short—too long for the size of the book, too short to add anything new or to avoid generalisations. What Mr. Goodman does do is to ask that the Public Corporation should not be regarded as the only pattern for public control. He

suggests that the Development Council, aided by a Finance Corporation (such as the Finance Corporation for Industry) provides a better medium, preserving as it does the individual small unit. Thus he would ensure both that the worker does not get "lost" in the monolithic public corporation and that the public does not lose the benefit of competition. This may be a fruitful idea, and it is a pity that Mr. Goodman did not use all his small book to develop this critically. It requires examination as to its effectiveness to control economic power in the individual firms and groups; a comparison between experience in this country and abroad; between the councils and such devices as county agricultural emergency committees, and the efforts of the various supply ministries to "organise the unorganised" industries both for war and for the export drive. Incidentally, Mr. Goodman very pertinently asks that a detailed and objective study should be made of "what are the advantages of size and what are its disadvantages."

Economic Aspects of Nationalisation draws together the statutory provisions which have economic implications in the nationalised industries, thus defining their primary economic functions and indicating ways of carrying them out. Dr. de Neuman finds that these provisions are capable of different interpretations; he emphasises the tendencies in practice towards monopolistic behaviour and internal subsidies, and he inveighs against any principle other than that of covering costs. An intense study of the theory and practice of economic behaviour, of constitution and convention would have been a valuable addition to the literature in this field. As it is, half the space is devoted to the background, already well known; and the work is unfortunately marred by a number of errors, by a sometimes unhappy presentation of facts and by the use of outdated information.

This study was published in 1952, yet the Transport Commission is criticised for using, during 1950, phrases such as "economy in tractive efforts," "transport specially suitable and efficient," thus getting away from the lowest-cost principle. Surely mention should also have been made of their efforts then and since to close uneconomic lines, of their comparative costings of different services which appeared in the 1950 report and the principles apparent in their 1951 Passenger Charges Scheme. As regards the presentation of material—a quotation from the creating Act which describes the functions of the Colonial Development Corporation is followed immediately and starkly by this

sentence, "Its Gambia eggs scheme was almost a complete failure." What is the reader to assume from this? Finally, the opening paragraph states that pre-war nationalisation was used only when tariffs and subsidies failed to guide industries as the government wanted. Whilst, admittedly, this applies to aviation, what of such other ventures as the Port of London Authority, Forestry Commission, Electricity Board, British Broadcasting Corporation and London Passenger Transport Board?

Actual practice of the public corporations and the possibility of ensuring efficient deployment of their resources through "sticking grimly to costs" and promoting competition are matters of such importance as to merit accurate, intensive and objective examination. This they do not receive from Dr. de Neuman.

HENRY MADDICK

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The Chemical Revolution. By ARCHIBALD and NAN CLOW. (London: The Batchworth Press, 1952. Pp. xvi + 680. 50*s*.)

A BOOK avowedly straddling across economic history and the history of science, at least on the scale of this one, is a novelty we must welcome. Hitherto many of the standard text-books in economic history have provided, more or less successfully, some account of the central technical innovations—the steam-engine, the iron and steel processes and the textile machinery—of the Industrial Revolution, but there has not been any attempt to cover as wide a field as is included in this new book. In particular, by taking as their primary interest the changes in chemical technology, the authors have given a different emphasis from that of the conventional books. The interpretation they put upon "chemical" takes them over a field ranging from salt, soap and sulphuric acid to textile finishing trades, rubber, paper, glass, pottery, tar, gas-lighting, sugar, brewing and distilling, iron and steel, and fruit-canning. On many of these industries the economic historian has had to go to encyclopædias or to unduly heavy technical works, and the convenience of having the main stories brought together in a single book is a valuable acquisition.

Economists looking for the mainsprings of technical progress will find here much food for thought, though disappointingly little direct attempt to satisfy their curiosity. The very assemblage between two covers of so many stories dependent on the advances

in chemistry does, however, serve to underline the interrelations between advance in one industry and advances in many other industries. Apart from this, the authors emphasise two major forces: the pressure for new methods and new materials when southern and central Scotland had been stripped of their forests (a matter on which full acknowledgment is made to Nef) and the prolific flowering of the natural sciences in the Scottish universities in the eighteenth century. In several industries advances depended upon this advancement of learning—a movement deriving from the University of Leyden, and in its turn fertilising the older and the newer centres of learning (particularly Birmingham) in England. (Englishmen may console themselves with some exceptions to this north–south flow of scientific knowledge: porcelain was a notable example of a reverse flow.)

A book like this inevitably throws up a host of minor revelations. For myself, the story of gas-lighting, with its suggestions of influence upon the new factory structures and the length of the working day, was outstanding. New to me also, as one brought up on the story of Napoleon's army as the cradle of tinned foods, was the information (rather sketchy) that early interest in food-canning was naval rather than military, in both France and England.

For the wealth of material the authors have sometimes been able to draw on secondary sources, but for many subjects they have had to go to the papers of local scientific societies, technical periodicals and other original sources tucked away in the great libraries and record offices of Scotland and elsewhere. Their task must have been very heavy. They were rewarded by the Senior Hume Brown Prize in the University of Edinburgh, and they have the satisfaction of having made a notable addition to the literature of the Industrial Revolution.

R. S. SAYERS

London School of Economics.

Competition in the Rayon Industry. By J. W. MARKHAM. (Cambridge, Mass.: Harvard University Press (London: Geoffrey Cumberlege), 1952. Pp. xvii + 245. 32*s.* 6*d.*)

THIS excellent study of the American rayon industry will be of interest to a much wider circle of economists than might be inferred from its title. According to the Publisher's Note, this book "is at once the first economic study of the United States rayon industry, a case study in the control of a market by the few,

and an exploration of the concept of workable competition." These claims are well justified, with the possible exception of the first, although even this may be accepted on the grounds that previous studies of the United States rayon industry have been concerned more with description than with economic analysis. Mr. Markham does not indeed fail to give us a certain amount of description, but he is mainly concerned with those aspects of the industry's working that are of particular interest to economists. Price and production policy, obstacles to entry, elasticity of demand, short- and long-run costs of production: these and many other topics are dealt with in the course of the book, which adds considerably not only to our knowledge of the rayon industry, but also to our general understanding of competition among a small number of firms.

It is possible to criticise Mr. Markham on the grounds that, in his eagerness to clear the way for the more theoretically interesting parts of his subject, he makes one or two rather sweeping generalisations on technical matters in the early part of the book. For example, his statement that "in a number of market areas acetate and viscose yarns are almost perfectly substitutable" (p. 63) might well be questioned. It is questionable also to point out that the rayon industry consumes only a small proportion of the wood-pulp used in the U.S.A. (p. 28) without mentioning the fact that the kind of wood-pulp used in rayon production is by no means a perfect substitute for the kind used in most other industries. It would, however, be churlish to dwell on such points, which in any case are few and do not affect the main argument, in view of the content of the rest of the book. The author goes on to examine, for example, how the existence of considerable economies of scale has affected the number and size of firms in the industry, and produces an interesting chart (prepared for him by one of the large rayon companies) which shows how costs of production vary with output in a given plant, and also how costs are affected by changes in the size of plant. He makes a detailed study of price behaviour, including an analysis of the firms which led and followed in all list-price changes since 1926, and provides evidence that, in times of depression, cuts in list prices apparently initiated by the largest producer were in fact forced upon it by secret price cuts on the part of the smaller firms. Mr. Markham suggests that one reason for this *de facto* price leadership by small firms in bad times may be that small plants are less flexible downwards than large ones. Costs per unit of output rise so rapidly in small plants as output is curtailed that firms think it worth while to

reduce price in an effort to maintain output, in spite of the probability that the large firms will very soon follow them down.

Mr. Markham makes it abundantly clear that price behaviour in the industry can by no means be interpreted in the light of cost considerations only, and much of the book is taken up with an examination of how market factors influence price. Competition with other fibres and with foreign rayon producers, the possibility of new firms entering the industry, movements of demand over the trade cycle and many other factors come into the picture. The author does in fact explicitly consider the possibility that full-cost pricing has prevailed in the industry, and rejects the idea for several reasons, one of which is the lack of evidence that either variable or total costs have in the past borne any approximately constant relationship to price. This method of proof is open to the objection that one would not in practice expect a constant costing-margin to be reflected in a constant profit on sales, since there must be frequent divergences between actual output and the output assumed in calculating the costing-margin. Even when allowance is made for this, however, it is impossible to believe from the figures, especially those for the years before 1929, that full-cost pricing has been generally practised in the industry. In any case, Mr. Markham has provided more than sufficient qualitative evidence in the rest of the book fully to support his view. It is surprising, in the light of this, that a study of the rayon industry in this country should have helped Mr. P. W. S. Andrews to develop the full-cost principles enunciated in his *Manufacturing Business*. It would, I think, be difficult to argue that any differences between the pricing policies of the British and American rayon industries have been sufficiently marked in the past to justify as great a divergence of view on this subject as that which appears to exist between Mr. Markham and Mr. Andrews.

The book ends with a consideration of how far competition can be considered " workable " in the American rayon industry. Mr. Markham is fully aware that workable competition is a highly subjective concept, and he spends some time in trying to arrive at a satisfactory formulation of it. Although he readily admits that others may not share his view, his conclusion is that the industry can be considered workably competitive at present. He does, however, propose a reduction in the U.S. tariff on rayon goods, since it would give a stimulus to greater competition in the industry, and would have the additional advantage of helping other countries to earn dollars.

This volume is the first of a series of studies on competition

and monopoly in American industry financed by a grant from the Merrill Foundation for the Advancement of Financial Knowledge. We shall be fortunate if later volumes in the series come up to the standard set by the first.

AUBREY SILBERSTON

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Cambridge.

The American Cigarette Industry. A study in economic analysis and public policy. By R. B. TENNANT. (New Haven: Yale University Press, 1950. Pp. xxvi + 411. $5.00.)

Price Policies in the Cigarette Industry. A study of "Concerted Action" and its Social Control, 1911–50. By W. H. NICHOLLS. (Nashville: The Vanderbilt University Press, 1951. Pp. xx + 444. $6.00.)

IN 1949 the American people consumed 352,000 million cigarettes, on which they spent $3,500 million through the normal channels of trade, as compared with $13 million spent on 3,000 million cigarettes in 1900, a 120-fold increase in consumption in fifty years. During this period there have been two successful Sherman Act prosecutions. In 1911 the near monopoly of the American Tobacco Company was squashed and its business was divided among a small number of successor companies. Thirty years later, three of the major successor companies, controlling by then seven-tenths of the national output of cigarettes, were once more found to constitute an illegal monopoly, a decision inferred from their detailed similarity of behaviour. The conviction was upheld by the Supreme Court in 1946. The continuing threat of remedial action by the appropriate authorities following the court action raises important issues of public policy: namely, how to deal with oligopolies which have become one of the prevalent forms of industrial organisation. Two able economists, independently it appears from each other, undertook a full-scale economic analysis of the cigarette industry with a view to both developing a theory of oligopoly behaviour and providing guidance for public policy. Both authors have made use of the enormous amount of documentation which was brought to light in the various court processes. The two authors cover broadly the same field, though with varying emphasis on certain problems, which makes both books worth reading. Both books are superbly documented, and make students of British industrial economics very envious. Throughout they preserve a nice balance of

economic analysis and factual description. Together the two books present as detailed a picture of the industry as could be desired. The reviewer found Professor Tennant's book somewhat more congenial reading, though the agricultural economist will find Professor Nicholls' analysis of the leaf market especially valuable. He also gives a very detailed post-mortem of the 1941–46 anti-trust trials which brought oligopolistic market structure and behaviour by itself within reach of successful prosecution under the anti-trust laws.

The history of the industry shows a steady growth of consumption since the civil war, cigarettes slowly displacing other tobacco products in the public favour. The turn of the century was marked by the conquest of the industry by James Duke, who already used sales and advertising policies as his principal instrument of market control. The dissolution of the monopoly merely ushered in the oligopoly of the successor companies with even heavier pressure on the independents. Between 1912 and 1923 there was, nevertheless, some price competition; only in the 1923–31 period did oligopolistic price policies emerge and did "advertisement become king." This development was the consequence of the "Camel revolution," namely the introduction by Reynolds of a new blend of cigarette by the application of new manufacturing and marketing techniques. Two competitors followed the example almost at once, and by 1925 the three new-type brands—Camel, Chesterfield and Lucky Strike—accounted for 82% of the national output. Concentration on a single brand became a fundamental principle of selling policy together with advertising by publicity expenditure on a national scale instead of prizes and premiums as in the past. In 1923 identical price lists, discounts and net prices were established and the era of experimentation with price competition was brought to a close, with Reynolds accepted as a price leader. A pricing error by the big three in 1931 once more brought into the picture the independents with their economy brands. They also benefited from the great depression and later on from the war. With the end of the war consumers flocked back to the regular brands, and the three major producers were in 1950 in as dominant a position as they were in 1930.

Two features dominated the industry throughout this period: a constantly high concentration of output and constantly high profits, largely achieved by the powerful use of advertising. What were the factors determining this concentration of output and its skilful exploitation for profits? Professor Tennant argues very convincingly that the nature of cigarette demand more than

anything else has been responsible for many of the industry's outstanding peculiarities. He suggests that the continuous growth of demand has been affected little, if at all, by anything which the industry itself has done. In the short run, cigarette demand exhibits some sensitivity to changes in the national income, but is almost wholly inelastic in its response either to price or to advertising. The demand for individual brands is, on the other hand, highly sensitive both to price and to advertising. The main brands in the same price class are nearly identical in their physical characteristics and are close substitutes. Price cutting can be an efficient market weapon, but invites retaliation, while advertising is most effective when mass expenditures are employed to maintain and expand an already large business. Whether market pressures are applied through price or through advertising, the conditions of cigarette demand award considerable advantages to the concentrated resources of the large firm. The characteristics of leaf supply with the method of auctioning secure that all competitors in the market for output stand on the same basis of leaf-tobacco costs rather than provide undue advantage to the big buyers. Lastly, the technology of cigarette manufacture is almost neutral in its effect on industrial organisation. Costs of production are approximately the same at all levels of output, and the large firm is neither more nor less efficient than the small.

The competitive struggle among the major firms is carried out solely by advertising policies. Prices are kept identical, remain unchanged for long periods and are fixed by administrative decision of the price leader in a market which is almost perfect in the sense that the leading products are nearly homogeneous and that the going price is fully known. Although the major companies possess considerable tactical power over farmers and distributors, and although they have occasionally worked to reduce the rewards accruing to each, they have not generally found it worth while to tamper with the absolute level of leaf-tobacco prices or of distributors' margins. The aim of price policy is to maintain competitive equality with other firms and to achieve a unit margin which will not attract unwelcome competition. The division of that margin between advertising outlays and profits depends both upon the need for market pressure and upon the exactions of the shareholders.

Professor Tennant also draws some conclusion which is relevant to the full cost-marginal theory controversy. He does not think that the managers of the industry engage in subtle marginal calculations. Prices appear to be set on some principle of mark-up

over cost, and uncertainty as to just what the mark-up should be is probably an important cause of rigid prices. Nevertheless, he thinks that not only is maximum profit a meaningful concept in the cigarette industry but profits also appear to have been the principal object of policy, and consequently much of the traditional analysis is relevant, even if incomplete, to explain the complex historical developments and the industry's dynamic problems.

The studies also provide interesting information on the economic effects of advertising. Although advertising expenditure was throughout at a high level, unit advertising costs were falling over the years owing to the heavy expansion of output both absolutely and in relation to unit manufacturing costs and prices. The cost structure of the industry is such that (taking the results of the year 1941–42 for the six main brands) 44% of the net unit price received by the manufacturer, after tax, was accounted for by leaf-tobacco cost, 12·5% by direct factory cost, of which 3% was labour cost, 2% by freight and shipping, 15·5% by advertising and selling and 26% by the profit margin. Labour productivity (which is surprisingly not discussed by either author) increased fourfold in the last generation, according to the Bureau of Labor Statistics, but in the view of the above cost structure, savings on this account did not provide compensation for the heavy advertising outlay.

Professor Tennant's verdict on the industry is that it produces a good product at minimum costs and in the proper quantity. Both authors found, nevertheless, the behaviour of the industry faulty in two respects : the rate of profit was usually excessive, and a considerable proportion of the resources was devoted to competitive advertising which did not serve any justifiable economic purpose. Public policy could reasonably work to reduce both profit rates and advertising outlays. The anti-trust conviction opened the possibility of reform. But what could be done ? Can the cigarette industry be made more competitive ? Both authors are somewhat doubtful about possible remedies. Perfect competition is not attainable, owing to the character of the demand. A full monopoly would offer probable savings in advertisement expenditure, but Professor Tennant thinks that it might lack adequate incentive to maintain efficiency and quality, although Continental experience on this subject was not examined by him. Monopolistic competition of the Chamberlin type, which would result in another dissolution of the present corporations, might lead on balance to increased costs, mainly owing to higher distributive charges, although Professor Nicholls argues

that beyond the technical economies of the individual plant, the principal multiple-plant firms have achieved few economies which are social rather than private, and he sees no strong economic objection to a new dissolution. He thinks, however, that the price and business practices of the cigarette industry are undoubtedly typical of most other oligopolistic industries which rely heavily upon advertising, and he sees little merit in singling out the major cigarette firms for unusually severe treatment. He also thinks that dissolution by itself without control of the total advertising outlay of the big three and a replacement of the present specific tax by an *ad valorem* tax on cigarettes would be ineffective in bringing about true price competition, and he as well as Professor Tennant regard these last two measures by themselves as the best instruments of public policy in the circumstances. Professor Nicholls goes even farther, and advocates a highly progressive tax on total advertising outlays of individual firms as one of the means of the social control of oligopolies. These studies also demonstrate incidentally that even with the substantial experience and big apparatus available to the American control of monopolies, it is easier to establish the existence and effect of monopolistic practices than to evolve and enforce remedial action.

L. ROSTAS

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The Economic Prosperity of the United Provinces. By SHRI GOPAL TIWARI. (Bombay: Asia Publishing House, 1951. Pp. 367. Rs. 16.)

DR. TIWARI has attempted to apply Professor V. K. R. Rao's method of estimating the national income of British India to the United Provinces for the years 1921/2, 1931/2 and 1938/9. He has also improved upon this method, in a number of ways. In so doing he has carried out extensive personal inquiries, in order (wherever possible) to fill in the gaps in the available statistical material, and also with the broader object of ascertaining not only the *per capita* money income, but also changes in the *per capita* real income of the population. Nor does he stop at this point. In addition, he analyses carefully the conditions of life and work in the Province, tracing outstanding economic trends, and is thus enabled to suggest what have been the major factors at work affecting and altering the national income and its distribution. His book is therefore much more than an exercise in statistical method.

Indeed, he provides a moving picture (in more senses than one) of the economic life of the United Provinces over nearly two decades.

Dr. Tiwari has tackled his subject in scholarly manner, and interprets his data with objectivity and realism. The choice of one Province for detailed analysis has proved most valuable, as it has given a unity to his subject, and concreteness to his conclusions, which could hardly have been obtained from a study of the whole of India, which would necessarily have resulted in mere averages, concealing wide diversities and possibly contradictory trends.

His conclusions are " moving " in the sense that they reveal the absence of any definite improvement in *per capita* income, either monetary or real, between 1921/2 and 1938/9, whilst over the same period the distribution of income had become more unequal as between both urban and rural areas, as well as between agricultural and other occupations. The effects of this unfortunate trend were aggravated by the regressive character of the tax structure. But the picture painted is not all black. Some improvement in the working conditions of the masses, and in the position of tenant cultivators can be discerned.

Dr. Tiwari concludes by making some positive suggestions for improvement, stressing the need for a " conscious collective effort " if the economy is to be raised to anything like a civilised standard.

VERA ANSTEY

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Soviet Trade with Eastern Europe. By MARGARET DEWAR. (London and New York: Royal Institute of International Affairs, 1951. Pp. vii + 123. 8*s.* 6*d.*)

STUDIES of this kind are of the greatest value to any serious student of international economics or politics. They offer not only a basis for the evaluation of economic and political trends within the Communist orbit, of inestimable importance for general intelligence purposes of the anti-Communist alliance. They constitute also a valuable secondary source for the raw material of any serious analysis of the progress of a movement which constitutes, after all, the most outstanding economic, social and political phenomenon since the advent of liberalism and the industrial revolution in Western Europe.

The difficulties in the way of any study on the subject (except, of course, for the facile pronouncements of infallible experts in certain Sunday newspapers) are enormous. The statistics of Communist countries, with the slight exception of Poland and Czechoslovakia, are designed to conceal as much as they reveal. Not only is the basic statistical material inadequate and more often than not available only in the form of index numbers relating to a base year; many significant secondary series, which would enable the student to evaluate the significance of what basic statistics are published, are unobtainable. Statistics on the total value of foreign trade are practically useless, if they are not broken down into the usual categories such as food, industrial raw materials, metal goods, textiles, and so on, or if the prices at which goods cross frontiers are unknown. It need not be assumed that economic statistics in Communist countries are less well developed than they are in Western countries. The opposite seems to be true. But the blanket which covers economic facts in the Communist part of the world is regarded by its rulers as their defence against the economic and military advantages of the West, and it is not likely that this blanket will be lifted, unless in exchange for concessions by the West, which will reduce the economic and military odds against the East.

Within the limits of these almost insurmountable difficulties, Miss Dewar has done pretty well. Her book is both factual and thorough. These incontestable merits of the present study are, however, the obverse of its principal shortcomings. The author, unfortunately, brings to bear too little critical appraisal and too little personal judgment on the assembled statistical facts. Even so, her book seems to the reviewer a very useful, though more specialised, supplement to other more forceful publications in this field, of which Miss Doreen Warriner's *Revolution in Eastern Europe* is probably the most important one. While Miss Warriner takes sides quite openly, she has been much more successful than Miss Dewar in contributing to what might be called a theory of economic development under "People's Democracy." Her book is undoubtedly also the more readable one. In the exploration of this vast uncharted land the more pedestrian though painstaking study, which Miss Dewar's book represents, has also its place. But it would certainly have been improved if the arrangement of its contents had been by subjects rather than countries.

In conclusion, may I say that statistics published since the appearance of Miss Dewar's book support fully two points of her thesis: the increasing separation of the East and West European

economies (West European share in East European trade has declined between 1938 and 1950 from 33 to 18% and is still further declining) and the increasing dependence of Eastern Europe on the Soviet Union (the Soviet Union's share has increased from 1 to 34% and is still further increasing). There is also prima facie evidence for a further fact, mentioned by Miss Dewar, but not sufficiently stressed: the progressive integration of the East European countries and the co-ordination of their economies, apart from the Soviet Union, though certainly under her guidance and direction. Trade between East European countries (exclusive of the Soviet Union) has increased between 1938 and 1950 from 12 to 26%, and is still increasing. The rapid integration of China on the one side and of Eastern Germany on the other into the Communist economic orbit, in the last three years, is another important new tendency, concerning which there is not yet sufficient statistical evidence.

D. B. HALPERN

London.

The Soviet Economy during the Plan Era. By NAUM JASNY. (Stanford: Stanford University Press, 1952. Pp. 116. $2.)

The Soviet Price System. By NAUM JASNY. (Stanford: Stanford University Press, 1952. Pp. 179. $2.)

Soviet Prices of Producers' Goods. By NAUM JASNY. (Stanford: Stanford University Press, 1952. Pp. 180. $2.)

The Development of the Russian Iron and Steel Industry. By R. J. HOLLOWAY. (Stanford: Graduate School of Business, Stanford University, 1952, Pp. 59. $1.)

DR. JASNY'S three books are a remarkable *tour de force*. The author possesses a thorough knowledge of Soviet statistical methods, and has the "feel" necessary to dig every ounce of significance out of a wide range of fragmentary source-materials. One may disagree with a number of his opinions, but there is every reason to be grateful to Dr. Jasny for lighting up so many dark corners. No student of Soviet economic development and Soviet statistics can afford to be without these books.

Dr. Jasny analyses Soviet indices of national income and production, discusses the shares of investment, defence and consumption, assembles a mass of data on the movement of prices of various categories of goods, costs of construction, wages and so on; finally, he puts forward his own computations of national

income during the " Plan era," with his own indices. Clearly an ambitious task. His style has no pretensions to beauty, and the very fact that so much significant material is compressed into relatively few pages does not make for easy reading. The three books must be viewed as fragments of a single work in progress, rather than as three separate fully finished surveys, for there is much overlapping and cross-reference (for instance, a very interesting calculation of the level of Soviet money wages through the growth of the social insurance fund may be found tucked away in the volume on producers' goods). Such imperfections, however, are a small price to pay for speedy and timely publication.

Dr. Jasny might perhaps be aptly described as an angry scholar. In this field a dose of anger is not unjustified, having regard to the deliberately misleading nature of much Soviet statistical material and to its use by some of the more uncritical Western commentators (though this should not lead him to imply that views different from his own, even if mistaken, have any necessary connection with the Hand of Moscow, as from time to time he tends to do). But, if angry, he is also a scholar, always clearly distinguishing between the fruits of his indefatigable researches and his own opinions and deductions and emphasising the tentative nature of the latter.

Soviet national-income statistics were expressed until recently in terms of so-called " unchangeable 1926/7 prices," and the latest percentage-increase figures quoted by Malenkov at the Nineteenth Party Congress are linked to indices based on these prices. It has long been accepted by nearly all analysts that the published figures substantially exaggerate the growth of national income. Dr. Jasny is able to demonstrate convincingly that the exaggeration was due not only to the base and computation methods employed, but involved something that even a less-combative scholar would term manipulation (for instance, a fantastic $5\frac{1}{2}$-fold increase between 1928 and 1937 in the contribution of trade to the national income, the change to a " biological " assessment of agricultural production and so forth). However, one would like to know more about his assessment of the degree of exaggeration implied for machinery and armaments production, bearing in mind the very high prices of these goods ruling in the base year. Jasny himself quotes " pre-plan " prices of tractors and motor vehicles which were reduced in subsequent years, inflation notwithstanding, through mass-production economies, and one wonders just how much weight Dr. Jasny has given to this factor. In this connection, reference must be made to a little-known book by Alexander

Gerschenkron, *A Dollar Index of Soviet Machinery Output*, 1927/8–1937 (Rand Corporation, Santa Monica, 1951), where the way in which a choice of base year can transform a machinery production index is brilliantly demonstrated, using American figures.

Dr. Jasny seems also rather too confidently to reject the Soviet claim to have reduced substantially the cost of armaments in the course of the last war, insisting that heavy subsidies to arms production must have been involved. This is surely to underestimate the great economies inherent in mass production of standardised weapons—there is after all no reason to doubt the truth of Voznesenski's assertion that Russian weapons had not reached the mass-production stage until after 1940. It is worth noting that armament prices in the United States fell significantly during the War, despite the fact that both wages and cost of materials must have increased faster than in Russia.

The data on prices of producers' goods is of unique interest, especially as Jasny has been able to use sources which do not seem to be available in this country. He shows for the first time the extent of the great " zig-zag " in producers'-goods prices in the years 1949 and 1950, quoting evidence of two- and three-fold increases in prices of steel, coal, many freight charges, etc., and of a contrary move, though smaller in extent, during 1950 (Soviet books and periodicals available to the reviewer speak only of a " certain increase " in 1949, and go into detail only about the reductions of 1950). The whole episode reflects not too favourably on the elasticity with which Soviet price and planning mechanisms adjust themselves to changed circumstances.

There are some fascinating computations of the shares of investment and defence in the national income, and of the growth of national income in terms of " real prices of 1926/7 " (according to Dr. Jasny, it increased 2½-fold in those prices in the period 1928–40, impressive enough but still only half the Soviet claim). It is to be hoped that he will publish further details of the weights and price bases he has used, as these naturally affect the result to a substantial extent. This would be of great assistance to students of the subject, and make possible some valuable comparisons with other calculations.

Considering the scope of the subject and the nature of the data, there are remarkably few points of fact on which Dr. Jasny's version can be questioned. Among these few is the statement that only 1% of the state's social-cultural expenditure in 1935 was devoted to social security; he must have overlooked the fact that the figures which he was quoting did not include payments from

the social insurance fund. There is also reason to doubt his assertion that armaments are considered in the U.S.S.R. to be producers' goods; an authoritative handbook on statistics (*Slovar-Spravochnik po sotsialno-ekonomicheskoi statistike*, Moscow, 1948, p. 75) quite unequivocally treats them as a special kind of consumers' goods. Perhaps a more general criticism is that the reader will tend to underestimate the growing efficiency of Soviet industry and even of Soviet planners. Recent production figures, expressed in the more reliable quantity terms, are such that one simply must conclude that the system has come to work with a modicum of efficiency. True, Dr. Jasny himself warns us against underestimating the U.S.S.R.'s industrial might, nevertheless his own emphasis on failings—real enough, yet far from the whole picture—is conducive to such a misunderstanding. But these criticisms, it must again be emphasised, are of small significance relative to the value of Dr. Jasny's contribution. These books are indispensable for all interested in the subject.

The little book on the Russian iron and steel industry, part of a longer thesis, presents clearly and modestly such output and location data as is available. Dr. Holloway makes the surprising point that Soviet planners of the thirties located very nearly half their new blast furnaces in the vulnerable South, where they were promptly overrun by the Germans within a few months of the outbreak of war. There is no discussion of prices, and little about labour problems, but within its limits this is a thoroughly useful publication.

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Social Aspects of a Town Development Plan. A Study of the County Borough of Dudley. (Liverpool University Press, 1951. Pp. 168. 7*s.* 6*d.*)

This is an admirable example of how public authorities (in this case the Dudley Borough Council) and academic institutions can work together to their mutual advantage. The Survey sets out to answer three sets of questions, corresponding to the three environments—the family, work and the local community—in which people pass the greater part of their lives. Is the concept of the neighbourhood significant, and of practical value to the planner? What part has the development or redevelopment of industry to play in the social as well as the economic life of a town such as Dudley? What, thirdly, of significance to a local housing

and town planning authority, can be said about problems of the family: the aged, the schoolchildren, the housing situation? A fourth question follows from the first three. Granted that something must be done, in a town such as Dudley, in each of these directions, who is to do it? What changes are implied in the activity of the town council or of the local community as a whole?

The first question is answered particularly clearly and well. The concept of the neighbourhood does have real significance. People's use of shops and services, their friendships and other personal ties, do tend to focus—among other ways—into "neighbourhoods" of, in the case of Dudley, from 5,000 to 10,000 (in one case 15,000) inhabitants. Dudley neighbourhoods differ greatly in their effectiveness in thus focusing their inhabitants' interests and serving their needs. If the defects could be cured only by complete physical reconstruction there would be little hope; for, except in the worst blighted areas, complete reconstruction is not practical politics. But there is in any case no need of it. Most of what is needed to make neighbourhoods effective can be done, so far as physical development is concerned, by quite modest schemes of regrouping shops, building community centres and improving open spaces. Elbow-room for such schemes is offered by the patches of derelict land which abound in Dudley, as in the rest of the Black Country; an opportunity as well as a problem.

The local authority needs also to do more to stimulate the initiative of people in each neighbourhood, since the integration of a neighbourhood is a function of the extent to which people actively participate in its life. This is in fact the keynote of the Survey. The authors examine the possibilities of stimulating participation under such headings as education (including community centres), housing, health services (perhaps on the lines of the Peckham Experiment) or the Youth Service; and, generally and especially, through neighbourhood associations. They also bring out the strength, in spite of a gross lack of shops and services, of local attachment in a recently developed neighbourhood most of whose people had freely chosen to live there. This is in striking contrast to another estate to which families have come not from choice but through their place on the Council's housing list; many of them, to make matters worse, being far from enthusiastic at having to share their estate with people moved from the slums.

The second question, on industry, is less fully answered, for reasons outside the investigators' control. Their terms of reference were limited to Dudley. But Dudley is, industrially, an integral part of the Birmingham–Black Country conurbation,

and the report has simply to say that the question of the right balance of industries for the town can be answered only by reference to the conurbation as a whole. Nevertheless, the Survey is able to make some useful points. A strong case is shown for re-grouping the small plants typical of Dudley onto trading estates. The fact that 40 per cent of the town's workers are employed elsewhere seems to improve rather than damage its social life. An exception is the trade union movement, whose contribution to Dudley life is hampered by centralisation in Birmingham.

The sections dealing with problems of the family are the least satisfactory in the book. It is important to the local authority, and of some general interest, to know that Dudley has a 25% shortage of houses, but relatively few old people, and no such bulge in the school population as worries education authorities elsewhere. Some of the technical methods employed to clear up these points are novel and of interest elsewhere. But the question of the family's role in the neighbourhood is never fully or clearly formulated, and many of the chief issues it raises are touched on only superficially, if at all. Examples are the question of the place of grandparents in the home, of home ownership and the family's stability in one house, of the family's participation as a unit in neighbourhood life; the possibility, as in France, of family movements providing their own district or neighbourhood services on a co-operative basis; or the question of the relation between rent rebates and family allowances.

Certain pioneers of town and country planning, and notably Patrick Geddes, regarded planning as the key service of local government. This was not because it covers all of local government, or local life. It is in fact concerned directly only with the bricks and mortar aspects of land use. It was rather because the planning survey provides a convenient starting point for a general review of a town's life, and for an effort to mobilise all the forces, public or private, which can contribute to its physical or social development. In answering their fourth and last question (" how is it to be done ? ") the authors of the Survey take a similar view. Their approach illustrates the tendency for the accent of local government to shift, in the last few years, from the provision of often somewhat miscellaneous services to planning for the general welfare of each local community, and from physical to " community-building " services. It is also typical of much recent thinking on the problem of what is to follow the Welfare State. Individualism and competition, overall planning and direction are all useful in their place. But experience shows that,

for efficiency and personal interest and development alike, it is necessary to find ways and means of increasing personal participation in decision-making beyond the level reached under plain state or municipal planning, without falling back into crude individualism. This involves exploring a third set of possibilities, concerning the role of such intermediate groups as the family, neighbourhood, firm or profession, and of educative and consultative mechanisms. This is the direction in which both social policy and social science are moving, and the Dudley Survey is one of many signs of the way the wind is now blowing.

One can only welcome this trend. It does, however, raise certain problems of presentation. Nature, modern science explains, proceeds by jumps. So—and not only judging by the experience of 1944–49—do politicians and administrators. But the politicians' and administrators' jump has to be carefully and lengthily prepared if it is not to end in disaster. The role of applied research is not merely to reach what might be called laboratory conclusions. It is also to help the practical man to work through his problems, starting from not only the facts but the concepts (often the myths) with which he is familiar. He needs not merely answers, but help in defining his problem. The Dudley Survey is an admirable example of the correct approach. One can see, at the end of the road down which it points, revolutionary developments in both local and national government. The authors hint at a world where it will seem nonsensical for houses to be built or managed by Councils, rather than tenants' or owner-occupiers' co-operatives; for community centres to be financed or controlled by a Borough, rather than by ward or parish councils for the areas they serve; for trading estates to be anything but co-operative societies of the employers, workers and local authorities concerned with them; a world where health centres will look very like the Peckham Experiment, and very unlike the National Health Service or municipal clinics. But all this is between the lines. There is no overt incitement to revolution. There is merely a clear, sober, eminently acceptable and even sometimes rather timid statement of what the Borough Council can do next. Let us hope that Liverpool University will in due course tell us of the sequel; of how the Council's ideas change as experience accumulates and the new perspectives open out, and of how the applied research worker can follow up his initial contribution by clarifying and accelerating this further process of thought.

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The Cost of Health. By F. ROBERTS. (London: The Turnstile Press, 1952. Pp. 200. 16*s*.)

THE first ten chapters of this book give a vivid and vigorous account of the evolution and expansion of medicine in recent times. Dr. Roberts summarises in brisk English free from jargon just what the sociologist and administrator want to know. Down to the nineteenth century the physician and the surgeon alleviated pain a little, patched up injuries, persuaded a few patients to lead healthier lives. But on the whole they had little influence on the health of nations. Plague and pestilence still took their toll, populations increased slowly, expectation of life remained brief. Then science began to influence medicine. Public sanitation and compulsory innoculation almost wiped out cholera, smallpox, typhoid. Cleanliness and asepsis in nursing and midwifery played their part. Populations multiplied, the expectation of life increased. Science applied to medicine had definitely improved the public health.

By the end of the century the Universities made a small beginning with medical research, which had hitherto been left to individuals who had leisure and means as well as aptitude. "Clinical medicine, however," says Dr. Roberts, "held aloof continuing its empirical tradition." Perhaps he is recalling his own student days when he writes: "Clinical judgment of the old-fashioned kind, the oracular pomposity with which it was often delivered and the deference which was its due were prerogatives of the masculine mind to be defended at all costs from feminine intrusion."

Once it had gained its foot-hold, science was not to be shaken off. Indeed, it progressed at an accelerating rate; but the public, and even the administrators, were not aware of what was going on in the laboratories. Lord Beveridge's calculations of the cost of a National Health Service, based upon the experience of preceding years, were out of date before his Report was printed: not merely because of rises in prices, but because of the immense leap forward which medicine was ready to take once the war was over. "The progress achieved in the last five years," says Dr. Roberts, "has been stupendous"; and he proves his case.

Charts and tables based on records of Addenbrooke's Hospital, Cambridge, the Central Middlesex Hospital and the Royal Infirmary, Edinburgh, illustrate the growth in numbers of X-ray and pathological examinations, enumerations of blood corpuscles and blood analyses, waiting lists for hospital admissions and the

mounting cost per patient. They all show much the same trend—and so does the cost per patient at the municipal hospital in Oslo. The curves mount slowly from 1920 to 1942, and thereafter soar upwards. There is a similar growth in the numbers employed in hospitals. Evidently the National Health Service inherited but did not cause the revolution. Nor was it a sudden outbreak of "something-for-nothing" malingering after the establishment of the Service which upset the estimates. It is not merely that penicillin, aureomycin, streptomycin, X-rays, isotopes, electrocardiographs and so on are costly to make. Their full application and most effective use require hospital attendance by the patient, and above all an increasing army of technicians—radiographers, electrocardiographers, theatre technicians, laboratory technicians, even "V.D. technicians"!—in addition to doctors, nurses and record clerks. Sixty per cent of the cost of the Health Service is the cost of hospitals; and, of the latter 60% is the cost of staff. The service had been launched upon a rising tide which would have swept it forward however prescient the navigator.

Does the gain in prevention of disease and restoration of health and earning capacity outweigh the greatly increased cost? Perhaps Dr. Roberts would not answer this question with an unqualified "no"; but he warns that we are very near the point, if we have not already reached it, where continued expansion and further expenditure must yield a rapidly decreasing return. Tuberculosis, malaria, venereal disease and many other killing or seriously disabling afflictions are being conquered as smallpox and diphtheria were not long ago. But the end of that sort of achievement is in sight. These are acute diseases. When we cure them we benefit the young more than the old, and for the time being increase the working and productive population. But there remain the chronic diseases, which "are due partly to the slow cumulative action of the environment, but chiefly to innate weaknesses which are inherited, and they are associated with the natural process of senescence." As the number of the elderly and aged grows so the volume of sufferers from these diseases grows. Medicine cannot cure them, it can only prolong the life of the sufferer. Senescence may be prolonged: it cannot be prevented. The number of aged non-producers steadily increases. The justification for such prolongation is humanitarian, not economic. So Dr. Roberts concludes that "we are rapidly approaching the time when humanitarian demands can be satisfied only by inroads upon our resources prejudicial to our standard of living. . . . A free and comprehensive health service is a noble

ideal, but one which the country cannot under existing conditions attain."

This interesting general thesis is expounded with skill and vigour in the first ten chapters of the book. If at that point Dr. Roberts had put his problem to someone well trained in economics and with a knowledge of public administration, the book would have been of great value to future Ministers of Health. Unfortunately he ventured into the administrative field unaided. The last part of the book, apart from the summary final chapter, is a jumble of *obiter dicta* unwarranted by evidence, of amusing and sometimes useful jottings about extravagances in the Service committed by doctors for which blame is laid upon the patients, and of arguments founded upon irrelevant statistics. Though 97% of our population use the Health Service and less than half the population are contributors to National Insurance, though the Health Services are set up by two Acts of Parliament which are entirely separate from the Insurance Acts, Dr. Roberts is determined to believe that the National Health Service is a form of Health Insurance. He knows perfectly well that the Service, which spends more than £470 million a year, receives an appropriation in aid of only about £40 million from the Insurance Fund (though in the table in the Appendix he refrains from mentioning this). Yet he asserts: "Private insurance companies honour their undertakings or go out of business. How the State has defaulted needs no emphasis . . . premiums, however, were and are compulsory!" Elsewhere he says that "the first year of the National Health Service saw a rise in absenteeism in the Royal Ordnance factories from 2·6 to 5·9%, a fact which could not be accounted for by epidemics." The implication is that it could be accounted for by the establishment of the Health Service. The accuracy of such a conclusion could easily have been checked by comparing these figures with the movement in all claims for sickness benefit in the same period. In fact, of course, it was not the availability of free treatment by the Health Service which produced this result: it was the institution by the Ministry of Supply of a new system of paid sick leave.

It is unfortunate that the latter part of the book prolongs the misunderstandings and perpetuates the atmosphere of ill-temper and wild allegation amid which the Service was established. Nobody whom I have ever met believes that the sky is the limit in Health Service expenditure. Few engaged on its administration have failed to see that there must be priorities: indeed, insistence upon priorities explains the great achievement in the

devotion of resources to the treatment of tuberculosis and the growing emphasis upon rehabilitation after most forms of hospital treatment. But the determination of priorities must proceed with the objectivity and freedom from sentimentality which distinguish the first part of this book and disappear in the second.

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The Economics of National Insurance. By ALAN T. PEACOCK. (London : William Hodge, 1952. Pp. 123. 8*s.* 6*d.*)

THE place and purpose of the social services in the general structure of the economic system has received far too little attention from economists. At one extreme we have Professor Seymour Harris's *Economics of Social Security*, in which The New Economics runs riot; at the other the Beveridge Report and its satellite literature, which is more concerned with administrative and financial detail than with economic principle. At a different level there are some useful statistical studies of the redistribution of incomes through public finance. On the fundamental questions, however, we have very little guidance: Of what significance is the share of the social services in the total national income, in money, or more important, in real terms? What are the relative merits of discriminate and indiscriminate benefits, of money benefits and benefits in kind? What are the respective roles of budgetary and extra-budgetary funds in the finance of the social services? Above all, what sort of welfare criteria do the social services pursue, and are they mutually compatible? Mr. Peacock helps us with some of these questions by " using the tools of economic analysis in order to clarify the operation of a particular financial institution controlled by the State " (p. 124) namely, the National Insurance Scheme.

The author shows clearly that the Scheme is insurance in little more than name. Its principles have nothing in common with those of private insurance, and the continuous growth of the Exchequer contribution, financed out of general taxation, has already destroyed any actuarial relationship between contributions and benefits and made the Fund an integral part of Government fiscal and social policy. Similarly, the National Insurance (Reserve) Fund is a reserve in little more than name, since the

substantial annual surpluses which have gone into it have been used to buy Government stocks and support Government issues. The reserves are therefore completely under Treasury control, they can be " cashed " only by raising new Government loans or new taxation, and they are subject to political pressure on two sides : the beneficiaries believe that the reserves could be used to increase benefits; the Government regard them as an important element in extra-budgetary finance. Finally, Mr. Peacock examines the Rhys-Williams and Liberal Party schemes for the reform of social-security finance and presents some calculations of his own.

These conclusions about the true nature and significance of the national insurance scheme are indisputable. The reader may feel that Mr. Peacock is over-anxious to get them off his chest—the early chapters abound with " as we shall see " and the later with " as we have seen." He may also complain that Mr. Peacock, unintentionally perhaps, gives the impression that the chief cause of the trouble was the naïveté of Lord Beveridge, whereas in fact it was the inflationary policy of the post-war Governments. Take away the pressures caused by rising prices, the demand for higher pensions without higher contributions, the public concern about subsistence standards, the Government's manipulation of the reserve funds; and an independent scheme based on stable money values, which could reasonably be called insurance, is conceivable. But, for all that, the present state of affairs is undoubtedly as Mr. Peacock portrays it : the contributions are a regressive tax; the surplus is a compulsory loan; the reserve is a fiction.

So much for the results; let us now look at Mr. Peacock's use of the tools. Particularly interesting are those parts of the book in which the flows of income and expenditure associated with National Insurance are built into the social accounts. This method shows up very clearly the impossibility of separating the insurance funds from the Central Government accounts. It also facilitates a Keynesian analysis in which the role of the insurance fund in employment policy is discussed. Mr. Peacock examines critically the mechanism for varying contributions in order to control consumer demand (which was provided for in the Act but has not been used). He reveals the importance of the Insurance Fund's annual surplus (resulting from high employment) in budgetary policy; and the use of this surplus, for example by buying up " Daltons," to keep down interest rates. He reaches the nice conclusion (p. 88) that :

> " So long as any Government is not prepared to use the interest rate as a weapon of monetary policy, and inflation is to be prevented, then this form of compulsory saving by the National Insurance Scheme is an expeditious if not entirely honest method by which compensatory policy through the budget can be facilitated. But so far as beneficiaries of the scheme itself are concerned, their main concern should not be the ' losses ' suffered by ' unwise ' Government investment of insurance reserves, but the effect on the real value of their benefits if these reserves are used to support a financial policy which has inflationary consequences."

When he turns (in Chapter V) to discuss the Insurance Scheme as a redistributor of income, Mr. Peacock is less convincing, for his tools seem to be unequal to the task. He first tries to adapt Findlay Weaver's analysis (in the *Review of Economics and Statistics* in August 1950) to assess the redistributive effect of national insurance in 1949 as compared with 1938. Weaver's conclusions, which he bears out, are very sensible : " the benefits of redistribution cut across income groups and are largely related to consumption. . . . Those who do not smoke or drink, but who live in a Government owned house, wear utility clothing, use utility furniture and have a large family enjoy the maximum of benefits and pay the minimum of taxes " (p. 68). The actual figures, however, make such sweeping assumptions that one wonders whether the calculations were worth while.

Equally unconvincing is the brief excursion into welfare theory on pp. 74–6. Here we have a snippet of indifference-curve analysis; a suggestion that, in spite of assumptions about the value of free choice, real benefits may produce more welfare than money benefits; and a rapid conclusion that there is not " anything clearly definable and measurable as ' welfare ' even when it is accepted that there are economic, social and political aids to improving the condition of society " (p. 76). Now, all this may be true, and were he simply examining the present mechanism of National Insurance, Mr. Peacock would be justified in dealing with this passage fraught with difficulty as did a certain Presbyterian minister : by looking it squarely in the face and passing on. The trouble is that the whole of his important final chapter on the Reform of Social Security Finance depends for its validity on the underlying welfare assumptions.

In principle, his scheme originates with Lady Rhys-Williams proposals in 1943; in detail it is almost identical with the Liberal Party proposals of 1950. Briefly, he would replace the whole system of national insurance, food subsidies and progressive

taxation by a "personal allowance" of 12*s*. 6*d*. per head per week, plus supplementary allowances of 20*s*. per week for unemployment, sickness, widowhood and retirement. The whole is financed by a flat income tax of 5*s*. in the £ on earned incomes up to £600 and a supplementary tax of 2*s*. above that level, with corresponding rates of 6*s*. 3*d*. and 3*s*. on unearned incomes. The main objects are simplified administration and the removal of some existing disincentives to effort, and Mr. Peacock gives an impressive account of the administrative economies that would arise and presents some detailed and very interesting calculations of the financial results of the scheme from both the Government and individual points of view. The scheme is open, however, to two serious objections: First, it is a compromise, and may give us the worst, instead of the best of both worlds. If there were one standard rate of tax and one standard personal allowance, as in the original Rhys-Williams scheme, incentive would be doubly affected: the allowance would have to be at subsistence level, and taxation would be severely deterrent. But as soon as we depart from the rigidly simplified system—a sort of national taking in of each other's washing—and introduce some flexibility, we are back in the world of conditional benefits and progressive taxation, and it is difficult to say whether or not a highly complicated differential system, such as the present one, may not be better than the compromise of Mr. Peacock, apart from some administrative economies. Perhaps his only purpose is administrative economy, for the scheme appears to affect net earned incomes very little, except to give families with children earning below £400 a year substantial increases. It is obvious, however, from his discussions on pp. 74–6, 91–3 and 112–14, that he would like to draw some "welfare" conclusions, if only he could postulate a criterion of welfare, and this he will not do because there is "no generally accepted criterion."

May we suggest a way out of this difficulty which would have given Mr. Peacock's book and much other writing on the social services, a more satisfying conclusion? We *must* postulate certain clear aims for the social services before we can discuss the relative efficiency of different schemes. There are at least five such aims, and they are not compatible: the relief of poverty (the provision of a money income to ensure a minimum standard of subsistence); the provision of real services according to need (health and education services, with no limits of standard—"the best possible education"); the reduction of inequality of incomes; the socialisation of income (indiscriminate subsidies, free rations

and "social dividends," by which some part of everybody's real or money income is received from the State); the support of general economic policy (the manipulation of social-service benefits to promote employment, prevent inflation, etc.).

It is impossible to carry on a discussion on the assumption that all these aims are not only desirable but also attainable at the same time. Yet this is precisely what usually happens. A superb example was the discussion on food subsidies at the time of the general election : one contestant attacked them on the ground that they did not reduce inequality, another defended them on the ground that they did remove poverty, a third pointed out that their original purpose was to prevent inflation. Mr. Peacock's arguments reveal the same difficulty : at one stage he is discussing welfare in terms of freedom of choice, at another in terms of equality of incomes, at another in terms of subsistence minima and, though he does not say so, his plans for reform assume that it is desirable to socialise £5,455 million of the national income, of which £2,090 million would be paid out in indiscriminate *per capita* money benefits.

Surely it is legitimate and in good tradition for economists to take each criterion in turn, narrow and unrealistic though it may be by itself, and test each scheme in relation to it, leaving the politicians to balance one criterion against another, which is the very art of politics ? If, for example, the purpose of the social services is to relieve poverty, then the most efficient system is a highly discriminate scheme, with means tests and as much individual case work as possible, to bring those below the poverty line up to it and nothing more. Something like this assumption was at the basis of the recent pamphlet (*The Social Services : Needs and Means*) by Iain Macleod and J. Enoch Powell. If the purpose is equality of incomes, the more progressive taxation we have, the better. If the purpose is socialisation of the national income, indiscriminate subsidy is completely justified. If the social services are to be the handmaid of general economic policy, we can justify the cutting of pensions in time of inflation. And so on. The analysis of social problems in this piecemeal fashion is not conclusive, but our assumptions are no less respectable than the usual assumptions of welfare economics, and it may be that this is the best we can do without "sending for the prophet and the priest." Possibly the experts could represent the simultaneous pursuit of two, or even three, of our social objectives on some kind of preference map, if they were first given certain postulates about the relative values of these objectives. But the

postulates would be nothing more or less than Bergson social-welfare functions, and a Bergsonian regime is not everybody's choice.

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The Government of British Trade Unions. By J. GOLDSTEIN. (London : Allen and Unwin, 1952. Pp. 10 + 300. 25*s*.)

THE Transport and General Workers' Union is by far the largest Trade Union in Great Britain. It is made up of many diverse groups, and will in effect enrol almost anyone except a worker for whom some other Union can put forward evidently superior claims. It has grown out of a nucleus which consisted originally mainly of dockers ; and its transport section remains the most highly organised and the most closely knit. To the original nucleus have been added by a mixed process of amalgamation and growth not only many other kinds of transport workers but also large groups occupied in engineering, chemicals, building, quarrying, flour-milling, agriculture, fishing and a host of other industries and callings. It has on paper a highly democratic constitution resting on a mixed system of grouping by area and by industry, with the control of finance and the power to authorise strike action concentrated in a general Executive Council which represents both these groupings. Final authority rests in theory with a biennial delegate conference, but this body cannot in practice do much more than amend the constitution and adjudicate through its special Appeals Committee in cases arising out of conflicts between members or branches or groups and the Executive. The other notable feature of its Constitution is that all its full-time officials, with the exception of the General Secretary, who is popularly elected, are appointed by the Executive Council and work directly under its auspices.

The Transport and General Workers' Union has at present well over a million and a quarter members, of whom the great majority belong to the less-skilled types of workers. Its contributions are low, and it provides only a narrow range of benefits. It is in effect almost exclusively a negotiating body, acting sometimes alone, but in many industries in conjunction with other Unions representing the more skilled or specialised workers. These conditions throw in practice a great deal of power into the hands of its full-time officers, not only because of the growing

centralisation of bargaining processes but also because they alone are equipped to handle the affairs of the highly miscellaneous groups of which many of the branches are composed.

Such a Union is far from typical of the Trade Union movement as a whole, though the Transport and General Workers' Union closely resembles its rival, the General and Municipal Workers, and these two between them account for over two million out of the eight million Trade Unionists affiliated to the Trades Union Congress. It is only to be expected that in a vast miscellaneous Union consisting largely of less-skilled workers democratic participation will be in practice at a lower level than in more closely knit Unions of a more homogeneous type. Indeed, the title which Mr. Goldstein—who is an American research student—has given to his book is somewhat misleading. He has investigated only this one Trade Union, and a large part of his book is concerned only with a single branch which contains less than 0·1% of the Union's members. The branch which he has specially studied may or may not be typical of the Union of which it forms part; the Union may in certain respects, but certainly does not in all, resemble Unions of different types. However valuable the light which Mr. Goldstein's work has thrown on the Transport and General Workers' Union, it would be most unsafe to conclude without further investigation that the Trade Union movement as a whole displays similar characteristics to anything like the same extent; and it would even be quite unsafe to apply what he says about the particular branch of which he became a member to all the sections of which the Union is made up.

Within the limits of the investigation, however, certain very startling facts do emerge. The most startling of all is the rate of turnover to which the membership of the Transport and General Workers' Union is subject. In the Union as a whole in recent years the average proportion of members lapsing from membership each year has exceeded one-third of the total membership, and even before the War, when the total membership was much smaller, it was over one-quarter. This has meant that in each year new members have accounted for well over one-third of the total, and that a relatively small proportion of the members have contributed regularly to the Union long enough to be qualified for holding any office in it. Indeed, a quite high proportion have been disqualified from voting or receiving benefits. This extraordinarily high rate of turnover is a consequence partly of members again and again lapsing and rejoining, but even more of the constant falling-away of members and enrolment of new members in

their place. The rate of turnover varies greatly from one section of the Union to another. In the docks section the average rate of lapse from membership is only 11·6%, whereas in the building section it is as high as 84%, and in the general workers' section, to which the branch specially investigated belongs, just under 40%.

This remarkable rate of turnover means that the Union is bound in practice to be run by a minority of the membership, but Mr. Goldstein shows that the numbers actually participating in any active sense in the control of the Union's affairs forms only a tiny fraction of this minority. In the branch specially studied, which may not be typical, the active members, even quite widely defined, would not number more than 2% out of the 1,000 forming the branch, and a high proportion even of those who had been members for more than a year had never attended a branch meeting, and depended for their contact with the Union entirely on the particular shop steward whose job it was to collect their contributions. Mr. Goldstein also makes it plain that in this particular branch a high proportion of the members had joined the Union mainly because other people had joined it too, and took hardly any interest in its affairs, leaving a tiny minority of " activists " to conduct the affairs of the branch, with no attempt to control their doings. This, of course, made it easy for any active minority to capture the branch, and the particular branch studied was in fact mainly in the hands of a small group of Communists until the Union at its delegate Conference decisively excluded Communists from the right to hold office. The control then passed, Mr. Goldstein tells us, into the hands of Labour Party members, but these appear to have been largely the same persons, who had resigned from the Communist Party in order to escape the ban.

Although Mr. Goldstein's study can by no means be taken as generally applicable to British Trade Unions, or indeed as fully valid even for the Transport and General Workers, his investigations do raise certain very important issues : Is it desirable that there should be these vast Unions enrolling a highly miscellaneous body of members and run in effect by permanent officials and locally by tiny branch oligarchies easily open to capture ? Such Unions are bound to be regarded by the main body of members chiefly as business organisations whose paid officials are responsible for the maintenance and improvement of working conditions—that is, where the members give any thought at all to what the Union is for. In the old days of localised bargaining the position was considerably different, because the Union member had then

a much more direct concern with what was being done on his behalf, and there were many fewer permanent officials to whom the tasks of negotiation could be consigned. It is clearly impossible to go back to the old localised methods as far as general issues of wages and hours are concerned, but Mr. Goldstein is surely right in suggesting that the weakest link in Trade Unionism to-day is that which connects the organised factory or work-place group with the branch or district organisation of the Union, and that if Trade-Union democracy is to be made more real the improvement must begin at the factory level, with greater participation in factory meetings and wider powers for shop stewards and works representatives directly chosen by the workers in their face-to-face groups to adapt national agreements to the conditions of particular establishments.

Mr. Goldstein's book makes very depressing reading for anyone who wishes to regard the Trade Union as the instrument of industrial democracy, but the situation is perhaps not quite so depressing as Mr. Goldstein, studying an extreme case, makes out. A comparable study of the Mineworkers, or even of the Engineers, would probably yield substantially, though by no means entirely, different results. It is to be hoped that other Unions will not be discouraged from allowing such studies to be made by the somewhat uncritical use to which Mr. Goldstein has put his statistics. As statistics, these are sound as far as they go, and competently handled; but the conclusions which he draws from them are not always fully justified—much less to be taken as a fair statement of the position of British Trade Unionism as a whole.

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University of Birmingham Studies in Economics and Society. Monograph A 1. *Incentives and Work Analysis.* By W. BALDAMUS. (Pp. 78.) Monograph A 2. *Labour Turnover under Full Employment.* By JOYCE R. LONG. (Pp. 134.) Monograph A 3. *Absence under Full Employment.* By HILDA BEHREND. (Pp. 139.) (Birmingham: Faculty of Commerce and Social Science of the University of Birmingham, 1951. 15*s.* or $2.00 each.)

THESE three monographs, although by different authors and dealing with different subject matter, have a marked element in common. In each of them an industrial problem affecting

economy in production is studied and an attempt made to discover the various factors involved in the general result. In each case these causal factors are found to be multiple, some operating in some cases and some in others. Such a result is not in favour of the sweeping assertions that are sometimes made about an unfavourable industrial situation. It does, however, yield valuable information for the industrialist who is anxious to find out the real facts.

Dr. Baldamus finds that an unpleasant physical environment can be adjusted, provided the conditions of work and the social relations do not place an undue strain on the worker. He lays emphasis on what he calls "traction," by which he means the feeling of being drawn towards an activity. This is closely related to rhythm and ease of movement. It means that the worker is to some extent carried along without undue effort by the traction of the process, because the process is so arranged and the social situation in the factory is such as to make the activity mildly pleasant.

Dr. Long points out that labour turnover is more common among the unskilled and where there are other opportunities for employment. It is also affected by the distance from town and the facilities for getting to work. More careful selection would tend to lower it and also a more systematic introduction of the young worker to factory life.

Dr. Behrend's work shows how many different causes are involved in absence from work and also the considerable variation in the absence rate from factory to factory. When this is unduly high the causes can be examined in the way used in this investigation and possible remedies suggested.

These three monographs portray an interesting line of research in relating objective industrial situations to their various subjective causes. The authors point out that further research is necessary before some of the conclusions can be regarded as valid, and this is true, but what is really important is the method used, and this has great possibilities for further research.

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How the Civil Service Works. By BOSWORTH MONCK. (London : Phoenix House, 1952. Pp. 258. 25*s*.)

THE government of this country has been described as a parliamentary bureaucracy. But we are singularly ill informed about how the bureaucracy works. Most of the books about the Civil Service have been written by retired senior civil servants and have adopted, perhaps without intention, an attitude of defence and self-justification rather than of critical analysis. Mr. Monck during the war years was an ebullient and effective "temporary." At the time that he wrote this book he was chairman of the Fabian Society group which made a study entitled *Reform in the Civil Service.* His analysis of the Civil Service starts, very naturally, from the angle of one who wishes to see created an instrument for the carrying out of socialist, as well as any other, policy. But he is wise enough and experienced enough to appreciate and explain the doctrine of the political neutrality of the Civil Service and to see how a Civil Service must operate in a world in which the electors do not return the same party every time.

The second half of the book (Part V) is an account of the functions and organisation of all the various government departments. It is full of thoroughly useful information, not only for those who are unlettered in these things, but also for those who may think they know most of it already from an excess of past experience. The more stimulating first half of the book (Parts I–IV) deals with the general issues : who the Civil Service are and how they are recruited; the methods of financial control; the organisation of government; the relation of the Civil Service to the political masters. Mr. Monck has probed well below the surface, and brings out certain things with great clarity. The Civil Service is a huge pyramid. In 1950 thirty-four Permanent Secretaries, and sixty-nine Deputy Secretaries, with well under 3,000 others in the Administrative Class, were the apex of the organisation; the middle level was composed of just under 70,000 in the Executive Class; there were 300,000 in various clerical and typing grades. To those must be added a little over 100,000 in various professional, scientific and technical cadres. The shaping of policy lies mainly within the 3,000; its application chiefly with the 70,000. It is the selection, training and leadership of these that can make the Civil Service good or bad.

As to the selection, Mr. Monck is fairly content. He gives a lively account of a "house party" and seems satisfied that,

given the age and general policy of recruitment, the system gets the best men and women. He is reasonably satisfied with the internal opportunities for promotion from grade to grade. He is less satisfied that there is enough coming and going between the Civil Service and the outside world, and would like to see more use made of the existing, but virtually unused, arrangements for civil servants to take approved employment outside for a period of years.

But the most stimulating chapter is that on the public service and the government of the day. Mr. Monck probes the problem of the enthusiastic minister with a policy and the reputedly conservative Civil Service. He rightly, I think, exonerates the Civil Service of any desire to put spokes in the wheels: "I do not seriously believe that the Civil Service hampered the Socialist Government in what it tried to do." But he equally rightly insists that there is no real line of demarcation between policies and administration. A minister cannot expect to be able to lay down a policy on political grounds without reference to administrative possibility. Nor would a good minister wish to do so. The much more difficult problem arises when a minister without a formulated policy is confronted by a department of whose affairs he has no prior knowledge. With this problem Mr. Monck does not deal nearly as fully as its importance justifies. For many departments now require a complex and detailed professional knowledge for their proper administration. How far is it the function of the Civil Service to create policy for a minister? How far should a department have a long-term departmental policy, in some sense independent of minister and ministerial parties? The answer is not always obvious, either in the economic field or in such cases as education or colonial development.

The proper place of the Civil Service in making policy leads one inevitably to the closely associated problem of the function of the party organisations. Is there a place, or is there not, for advisers, who would share and help to develop the political preconceptions of ministers and who would fall with their ministers? The Civil Service itself has always, and with some justification, been frightened of such private armies, and has felt that divided counsels, in which one group bears none of the accountability, would break down the mutual confidence of minister and civil servant. Mr. Monck is non-committal. He shows the full extent of the powers that already exist to bring persons with special qualifications into the Civil Service either on a permanent or, much more easily, on a temporary basis.

This is a useful addition to the very limited literature of how our system really works in practice, which is often singularly different from how it should work in theory.

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The Cost of Industrial Movement. By W. F. LUTTRELL. National Institute of Economic and Social Research. Occasional Papers XIV. (Cambridge: Cambridge University Press, 1952. Pp. vi + 104. 18*s.*)

Costs in Alternative Locations: The Clothing Industry. By D. C. HAGUE and P. K. NEWMAN. National Institute of Economic and Social Research. Occasional Papers XV. (Cambridge: Cambridge University Press, 1952. Pp. vii + 73. 12*s.* 6*d.*)

BOTH these reports summarise the results (in the case of Mr. Luttrell's book the interim results) of closely related inquiries, sponsored by the Board of Trade through the "Clay Committee," into industrial location problems. The second mentioned above was carried out at University College, London, and the first was undertaken by the National Institute of Economic and Social Research.

Messrs. Hague and Newman have set out to discover how the private costs of certain London clothing firms have been affected by having been induced to set up plants in Development Areas (usually South Wales). They suggest, reasonably enough, that the relevant comparison is between the actual costs of an actual branch in a development area and the hypothetical branch which would have been established at the preferred location—the preferred location in all cases being one near the main factory in London. (These hypothetical costs had to be largely estimated from the costs of the London factory. This obviously introduces difficulties, since products, production methods and types of labour might all have been different.) So far as possible, of course, the comparison was confined to costs likely to be affected by locational factors.

Mr. Luttrell's problem is rather different, although he is also concerned with the economics of branch factories and restricts himself to private costs. He wishes to know how a firm's costs are affected by opening branches elsewhere (taking work to the workers) rather than by expanding production at the main works.

Various subsidiary questions also suggest themselves. For example, how long is it likely to be before a branch can be expected to be producing as cheaply as the parent establishment; why does the experience of different branches differ, etc.? For most of the cases he considers Mr. Luttrell makes three comparisons: first, a comparison of the actual unit costs of production at the main works with those of the branch over a period of years; second, a comparison of the cost of production at the branch with what it would have been if the branch output had been produced at the main works—this involved the assumption that labour would have been available at the main works which, of course, it was not; and, third, a comparison of the financial position of the firm (main works and branch) with what it would have been minus the branch and with no corresponding expansion of output at the main works.

Messrs. Hague and Newman approached twenty-eight firms (of which twenty-one supplied some information), but only four supplied sufficiently detailed information on costs for satisfactory comparisons to be made. The results show that firms have not been significantly affected by having been induced to establish branches in a development area rather than in London. Differences in the actual costs of the development area branch and the hypothetical London branch were generally less than 1% on turnover and actually varied between 0·25% in favour of the development area factory and 3% against it. Mr. Luttrell's interim report is mainly based on three boot and shoe and one engineering case study, though his conclusions are partly based on other cases for which full details are not given. Except in one case of a long-established branch, the branches are shown to be at a cost disadvantage with the main works—a disadvantage which narrows as time goes on, but is still of the order of 20% after a few years. The results also indicate a saving in unit costs of 25–30% if output had been expanded in the main works and the branch not established (the second comparison mentioned above), but in each case the establishment of the branch had resulted in a net gain to the firm in the sense indicated by the third comparison mentioned above.

We obviously cannot base any sweeping conclusions on such restricted data. Even within the field surveyed too many assumptions have had to be made, too many rough approximations established and too many relevant variables left out of account. The data set out by Messrs. Hague and Newman suggest that firms have not been penalised by having been diverted

from a preferred branch site to a development area. (It needs to be carefully noted that in the Hague and Newman report the establishment of a branch somewhere is taken for granted—the question is whether it is best established (from the firm's point of view) in a development area or near the parent establishment; Mr. Luttrell in effects asks if it is a good idea to have a branch at all.) But there are reasons (set out by the authors) for supposing that the clothing industry is very well suited to a development-area location. Mr. Luttrell's work invites the conclusion that it has been costly to firms to take work to the workers. (Indeed, it looks as if we should now inquire whether it would be more economical to take the workers to work, though social costs could hardly be ruled out in this case.) But here again the results are suspect, since hints are given that "extraneous" factors have had a great deal to do with the results, *e.g.*, the quality of the supervision (p. 33) and the scale of output (p. 40).

But even if we have not been provided with a sufficiently substantial basis of facts from which to generalise, the authors have produced some excellent by-products. Messrs. Hague and Newman have written an excellent short account of the main structural features of the clothing industry, and Mr. Luttrell, in probing the reasons for the different experience of different branches, has shown the importance of proximity to the main works, of careful training arrangements and of having a nucleus of people available who know the trade. But perhaps the greatest value of these reports is in their pioneering work on method. The very considerable difficulties involved in this type of research work are laid bare, and a start has been made in developing techniques which may go some way towards resolving them.

Some criticisms may be ventured. It is much to be hoped that these inquiries may later be extended beyond the limits of private costs, since policy is so often justified by reference to social costs. Also, Messrs. Hague and Newman argue that since employment is down (on 1939) and production is up, productivity is therefore up and that this may be due to line-production methods. One would have thought that productivity per hour or per shift was relevant in this case and that one can say little about this on the basis of average employment and (annual?) production figures without also considering regularity of employment. One also feels some doubts about Mr. Luttrell's method for adjusting for different types of product, though it is not easy to suggest a better and practicable method.

These, however, are matters of detail. Both books are to be

highly commended as adding significantly to our knowledge of the facts in a field of study where so much has formerly been based on guess-work. They both have the supreme merit of setting out precisely the questions to which an answer is sought and of marshalling their facts accordingly. The limits of their inquiries are inevitably narrow, but a valuable trail has been blazed.

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NOTES AND MEMORANDA

Forecasting From Econometric Equations: A Further Note on Derationing [1]

In a recent issue of the Economic Journal there appeared a number of estimates by Mr. Houthakker and Dr. Tobin of the free demand for rationed foodstuffs based on an econometric extrapolation of pre-war experience.[2] In the subsequent discussions that have taken place to assess the statistical reliability of the results presented there, a number of points have emerged which may be of interest to those who are concerned with the interpretation and application of similar methods of forecasting.

The method used was to estimate the parameters in the demand relationships by combining pre-war family budgets with time series of consumption, income and prices for the period 1920–38 and to insert into these relationships the changes in prices and incomes that had taken place between 1938 and 1951. The resulting forecast of free demand was compared with the supplies available in 1951 to decide whether there was a surplus or a deficit. The possible errors which are associated with a forecast of this nature may be listed under three main heads:

(1) There may be *errors of measurement in the variables* in so far as time series of aggregate consumption are estimates based on a wide variety of sources. These errors may be present (*a*) in the base period, when they will affect the reliability of the estimated demand relationship, and (*b*) in the forecast period, in which case there may be the additional complication that since the values of the determining variables are not known in advance they will have to be estimated on a less-reliable basis.

An example of both these points arises in the estimation of the average level of the real income of consumers. This is estimated by dividing average money income by an index of the cost

[1] The preparation of this note has benefited from discussions with Mr. J. A. C. Brown of the Department of Applied Economics in Cambridge and with Mr. J. L. Nicholson of the Central Statistical Office.

[2] "Estimates of the Free Demand for Rationed Foodstuffs," by H. S. Houthakker and J. Tobin, Economic Journal, Vol. LXII, No. 245, March 1952, pp. 103–18.

of living. Even if this procedure were wholly satisfactory on theoretical grounds, the considerable changes that have taken place between 1938 and 1951 will lead to some arbitrariness in the level of this index. Professor Allen's recent investigations on this subject [1] suggests that there may be an error of 3%, and an estimate of the change in the level of real income between these dates must be subject to a similar error.

Errors of type (*b*) only occur in this context in so far as official estimates of the national income become available with some delay; the values of the other variables, that is the prices of the commodities, are published with little delay.

(2) In applying a pre-war demand relationship to the post-war market, errors may arise because of structural changes in the economy, or more generally, because of the *possible inadequacy of the assumed relationship*. This is particularly clear in the case of the meat market. Though meat is generally regarded as a rationed commodity, there are many varieties of meats (and meat products) which are unrationed; on the average about half the meat bought by the housewife is of this type. It is possible to make allowance for the fact of rationing by working with a "virtual" price,[2] but, when the situation is as complicated as here, there is a considerable liability of error. The difficulty is particularly serious in this case, since meat is competitive with many rationed commodities.

Further, in analysing demand on the basis of some twenty annual observations it is only possible to estimate elasticities for the major factors responsible for variations in demand; those factors which do not account for a statistically significant proportion of the variation have to be omitted from the analysis. It appears to be a fact of the economic world that on the whole substitutional relationships between commodities are stronger than are complementary relationships. In conjunction with the principle of homogeneous demand curves, namely that the income and price elasticities of demand for a commodity sum to zero, it follows that weak complementary relationships will be relatively numerous. For this reason a statistical analysis of demand will tend to pick out substitutes rather than complements as related commodities, and the elasticity of demand with respect to all other prices will tend to be negative.[3]

[1] "Index Numbers of Retail Prices," by R. G. D. Allen, in *Applied Statistics*, 1, June 1952, p. 106.

[2] *v.* Houthakker and Tobin, *op. cit.*, p. 109.

[3] This appears to be the main point made by Mr. J. Downie in ECONOMIC JOURNAL, December 1952.

These facts are shown in Table I, which is based on a number of revised analyses carried out by one of us.[1]

TABLE I

Distribution of Food Elasticities

Range of elasticity.	Frequency of elasticities with respect to			
	Income.	Own price.	Other specific related prices.	All other prices.
<-2	—	—	—	2
-2 to $-1\frac{1}{2}$	—	2	1	—
$-1\frac{1}{2}$ to -1	—	5	4	5
-1 to $-\frac{1}{2}$	1	16	5	5
$-\frac{1}{2}$ to 0	4	10	7	9
0 to $\frac{1}{2}$	$10\frac{1}{2}$	3	$15\frac{1}{2}$	4
$\frac{1}{2}$ to 1	$12\frac{1}{2}$	—	$13\frac{1}{2}$	6
1 to $1\frac{1}{2}$	2	—	7	—
$1\frac{1}{2}$ to 2	2	—	5	5
>2	—	—	4	—
Σ	32 [2]	36	62	36

[2] There are only thirty-two income elasticities, since in four cases the same estimate had to be used for both the home-produced and imported product.

In so far as complementary commodities which are left out of an analysis are responsible only for a non-significant part of the variance, it does not seem that the considerations in the last paragraph on p. 10 afford any serious objection to the reliability of the results.

(3) Thirdly, there are *errors of estimation* which can be numerically assessed. These errors arise from the facts considered above, but are here considered formally. The standard error of a forecast from an equation may be considered in two parts; (*a*) that due to the unexplained element in the demand equation and (*b*) that due to the range of error in the estimates of the regression coefficients.

(*a*) The demand equations from time series considered here are computed from first-differences of the original observations; that is they are of the form

$$y_{t+1} - y_t = \beta(x_{t+1} - x_t) + \epsilon_{t+1}$$

where y_t is consumption in year t, and x_t is the value of the determining variable, say the price of the commodity, in year t

[1] They will be described in detail in the forthcoming *The Measurement of Consumers' Expenditure and Behaviour in the United Kingdom, 1920–1938*, by Richard Stone, which will appear in the series of *Studies in the Income and Expenditure of the United Kingdom* sponsored by the National Institute of Economic and Social Research and the Department of Applied Economics.

and ϵ_t is a residual assumed to be random.[1] In practice, of course, there will usually be more than one determining variable, but the simple illustration given here can readily be generalised to include such a case.

A forecast for year $(t + 1)$ can be obtained from a knowledge of y_t and the determining variable; this forecast is

$$y_t + b(x_{t+1} - x_t)$$

where b is an estimate of β. Another forecast can be obtained from a knowledge of y_{t-1}, and this forecast is

$$y_{t-1} + b(x_{t+1} - x_{t-1})$$

The difference between the two forecasts is that whereas the first forecast is subject to an error of ϵ_{t+1}, the second forecast is subject to an error of $(\epsilon_t + \epsilon_{t+1})$ the variance of which is twice as great. In general, it can be seen that if the residual variance relevant for a prediction one year ahead is σ^2, the variance for a prediction n years ahead will be $n\sigma^2$. The accuracy of the forecast thus diminishes fairly rapidly with time and, unless the fit of the equation is very good for the base period (say $R^2 > 0{\cdot}9$), it is not possible to make reliable predictions for more than one or two years ahead. To this extent econometric behaviour relationships are similar to autoregressive sequences considered in other contexts.[2]

It is, of course, true that if it had been appropriate for the demand equation to be fitted to the original observations instead of to their first differences this difficulty would not have arisen. Indeed, if the world were such that on taking differences of the type $(z_t - az_{t-1})$ where $0 \leq a < 1$ the errors were randomly distributed over time, the variance of a forecast n years ahead, due to the accumulation of error terms, can be seen to be

$$\sigma^2 \sum_{i=0}^{n-1} a^{2i} = \sigma^2 \frac{1 - a^{2n}}{1 - a^2} \quad . \quad . \quad . \quad . \quad (1)$$

This is considerably less than that obtained in a first-difference world (where $a = 1$) even if a is only slightly less than unity, and the advantage increases with the value of n. This is shown in the diagram below in which there is measured on the vertical axis the ratio of the variance (1) to that in a first-difference world, that is

$$\frac{V(a)}{V(1)} = \frac{1}{n} \frac{1 - a^{2n}}{1 - a^2}$$

[1] Cf. "The Demand for Food in the United Kingdom before the War," by Richard Stone, *Metroeconomica*, Vol. 3, pp. 8–27, especially p. 16.

[2] See "Prediction from Autoregressive Schemes and Linear Stochastic Difference Systems," by Richard Stone in the *Proceedings of the International Statistical Conferences*, 1947, vol. 5, pp. 29–38.

and on the horizontal axis the value of n. The curve for $a = 0$ represents the world in which observations are independent over time and provides the limit to which all the other curves tend as n increases except that for $a = 1$.

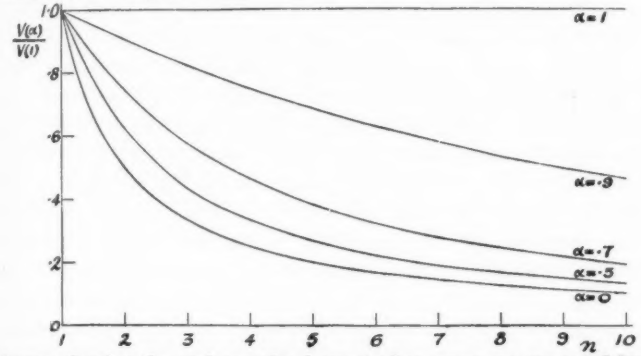

Diagram showing the variance of a forecast when errors are generated by the process $u_t = au_{t-1} + \epsilon_t$ with $0 \leq a < 1$ compared with the variance when $a = 1$.

If forecasts are required for more than one year ahead it seems therefore to be important to investigate whether the true value of a is in fact as great as unity.

(*b*) The variance of the forecast due to the fact that only an estimate of the regression coefficient is available rather than its true value will depend upon the variances (and covariances) of the regression coefficients and the extent to which the values of the independent variables in the forecast period have moved from their average value in the base period. The total variance of the forecast [1] is thus given by

$$\sigma^2_f = n\sigma^2 + \sum_j \sum_j x_i x_j \sigma_{ij}$$

where σ^2 is the residual variance; n is the number of years between the base year and the forecast year; σ_{ij} is the covariance between the i^{th} and j^{th} regression coefficient (the mean being also treated as a regression coefficient); and x_i is the value of the i^{th} determining variable in the forecast period.

To illustrate the magnitude of this standard error, a number of forecasts have been computed from the revised equations referred to above.[2] These forecasts are intended to show what would have happened on the assumption that the pre-war equations continued to operate in the period 1938–51, at least so far as the economic influences are concerned. It might be objected

[1] Cf. M. Ezekiel, *Methods of Correlation Analysis* (Wiley, 1945), p. 344.

[2] Their main differences from those used by Houthakker and Tobin is that a larger number of related commodities are included as well as a trend factor.

that in view of the changed circumstances of the war during which the pre-war model is known not to have held the disturbances could not accumulate in the manner described above. This assumption is, however, made here, and it is difficult to see what alternative hypothesis could have been put in its place.

So far as the non-economic influences are concerned, that is the residual trend factor, various possibilities are open. The first and most straightforward procedure from the point of view of a statistician would be to assume that the pre-war model was satisfactory in this respect also. This would involve the assumption that the pre-war residual trend continued throughout the forecast period and would permit a relatively simple handling of the variances of the forecasts. This assumption, however, seemed unrealistic, and accordingly was not adopted. It was therefore necessary to guess a value of the residual trend effect (represented in the first difference equation by the constant term) appropriate to the forecast period. The second possibility would then be to calculate the variance of the forecasts on the assumption that the trend effect had the value attributed to it. This would mean that the assumed value would not involve a contribution to the variance, since it would be calculated on the hypothesis that this value was correct. Such calculations are of interest, but their results would not indicate the range of uncertainty believed to be associated with the forecasts. In order to give an impression of this, a third possibility was adopted, namely to place the residual trend arbitrarily at zero over the forecast period, and to associate with this a variance equal to the estimated variance of the residual trend coefficient obtained from the pre-war equations.

The limits given in column (5) of Table II are accordingly based on this assumption. In addition, an attempt has been

TABLE II

Forecasts from Demand Equations and their Confidence Limits

(Ounces per head per week)

Commodity.	Consumption.		Forecast free demand.	95% confidence limits.	Percentage of variance ascribable to		
	1938.	1951.			Economic factors.	Trend.	Residual.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Butter . .	6·26	3·75	7·32	4·3–12·4	55	19	26
Margarine . .	1·54	4·02	1·40	0·7– 2·7	63	15	22
Cooking fat .	1·25	2·04	1·33	0·7– 2·7	3	41	56
Tea . . .	2·56	2·03	2·71	2·3– 3·1	23	27	50
Sugar . .	13·86	12·53	17·08	7·9–37·1	56	19	25
Cheese . .	2·45	2·78	2·06	1·4– 3·0	11	37	52
Bacon and Ham	7·43	4·96	6·09	3·5–10·7	17	36	47
Eggs . .	6·00	5·66	5·19	3·2– 8·4	13	36	51

made to give an impression of the extent to which the variances of the forecasts are due to their components. This is done in columns (6) to (8), which show the proportions of the variances due to : (1) the changes in the economic variables ; (2) the trend ; and (3) the accumulation of the residual elements. The covariances between the economic variables and the trend have been included in the first portion.[1]

The table shows that on statistical grounds comparatively wide error bands are associated with demand predictions based on extrapolations over a period of thirteen years. This, of course, limits the value of the method. The division of the variance into its components, as shown in columns (6) to (8), makes clear that its greater part is due to the large time interval between the base and forecast dates : forecasts for only a year ahead could be made with much greater precision.

In assessing the value of this application of econometric technique, as in all judgments of this type, the relevant alternative procedures must always be specified. If the economic world is indeed subject to significant disturbing factors, some of which have been listed above, it is not to be supposed that any other technique will yield superior estimates. The application of demand analysis, at the least, allows the separation of the effects of the major economic variables which, as indicated by column (6) of Table II can be estimated with some precision, from the effects of other factors. In view of the large total error associated with a forecast from a demand equation it would seem : (1) that it is always advisable to compare an econometric forecast with others that may be available ; and (2) that, as far as statistical hypotheses allow, it is desirable to set numerical bounds to its associated error. With these safeguards the examination of post-war forecasts for (unrationed) commodities and their comparison with actual values should be of interest.

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[1] It may be argued that in judging the significance of a forecast a one-sided test is appropriate, since the question is whether the forecast is significantly greater than a particular value. For the purpose of assessing the accuracy of the method the limits given by a two-sided test may, however, be more indicative, and this is the basis of the values given in the table. In the order of the commodities in the table, the probabilities that demand exceed supply on a one-sided test are, respectively : >99, <1, 11, >99, 79, 6 ,77 and 35%. In the case of tea it should be noted that derationing took place when supplies were close to the 3-oz. level. On the basis of this analysis, demand would exceed this level with a probability of only 9%, and a forecast that derationing at this level was practicable might have been made.

OFFICIAL PAPERS

The Reports of the Commission on Monopolies and Restrictive Practices

The Monopolies and Restrictive Practices Commission, set up under the Monopolies and Restrictive Practices (Inquiry and Control) Act of 1948, have now produced five reports; on dental goods,[1] signed on November 3, 1950; on cast-iron rain-water goods,[2] signed on February 16, 1951; on electric lamps,[3] signed on August 31, 1951; on electric wires and cables,[4] signed on April 25, 1952; and on insulin,[5] signed on July 31, 1952. In all of these cases the Commission were asked to investigate and report not only on the facts but also on whether the conditions found operated or might be expected to operate against the public interest.

In each of these five investigations the Commission have followed much the same procedure. After preliminary informal talks with the trade associations in the industries surveyed the Commission issued to them, to individual concerns outside the Association and sometimes also to those inside it, and to important or representative users and distributors, questionnaires designed to secure the necessary information for the factual part of their inquiry. They also asked for information on costs and profits, which was examined and usually supplemented by their own accountants. Their staff examined the records of the various Associations and of some large concerns and any agreements between firms or associations in the industry. In addition, the Commission advertised their readiness to receive in writing the views of anyone interested. Usually after taking oral evidence, and after submitting factual statements prepared by their staff to the Associations concerned, the Commission reached provisional conclusions on the factual part of their investigation, informed the relevant parties and asked for written comment. After this they invited these parties to formal hearings, at which the Associations in fact chose to be represented by Counsel, and finally reached their conclusions on the public interest.

[1] The Monopolies and Restrictive Practices Commission, *Report on the Supply of Dental Goods*, H.M.S.O., 3*s*. 6*d*.

[2] The Monopolies and Restrictive Practices Commission, *Report on the Supply of Cast Iron Rainwater Goods*, H.M.S.O., 3*s*. 6*d*.

[3] The Monopolies and Restrictive Practices Commission, *Report on the Supply of Electric Lamps*, H.M.S.O., 6*s*.

[4] The Monopolies and Restrictive Practices Commission, *Report on the Supply of Electric Wires and Cables*, H.M.S.O., 5*s*.

[5] The Monopolies and Restrictive Practices Commission, *Report on the Supply of Insulin*, H.M.S.O., 1*s*. 6*d*.

As a result of this procedure the Commission have produced clear and detailed surveys of the restrictive practices followed and of the degree of monopoly control in the five industries covered. They concentrate on the present, but also give some interesting information on earlier periods. It cannot have been easy to disentangle the facts and present them as clearly as has been done; yet the reports inevitably still make difficult reading. All five industries except insulin were found to come easily within the Act, in that agreements covered more than a third of the supply of the goods covered. Insulin certainly comes within the Act in so far as Burroughs Wellcome & Co. supplied in the United Kingdom more than one-third of the insulin; and probably also through the joint arrangements of the British Insulin Manufacturers, a semi-informal body on which collaborate the four firms making insulin, two of them under joint arrangements. Insulin manufacture presents a very special case, which is described separately later.

The basis for the monopoly power differs, of course, in the remaining four cases investigated, though there are certain common features. For dental goods this power rests partly upon the dominating position of the Amalgamated Dental Company and its subsidiaries, who between them supply nearly half of retail supplies of dental goods in the United Kingdom, but more largely upon the regulations and agreements of the Association of Dental Manufacturers and Traders (A.D.M.T.), an association of manufacturers and dealers controlling nine-tenths of the retail supplies of dental goods in the country. These arrangements provide for the collective maintenance of manufacturers' end prices (though not for agreement between manufacturers on these prices), for agreement by manufacturer members to sell only through dealer members and for dealer members to buy essential goods (in practice almost all dental goods) only from manufacturer members, for penalties, including expulsion from the Association and collective boycott, for limitation on membership and for discouragement of all competition between dealers.

For rainwater goods there is no dominating firm similar to the Amalgamated Dental Company; monopoly power here rests upon the Rainwater Agreements which the British Ironfounders' Association (producing about nine-tenths of the output of rainwater goods) make with the merchants' associations, through whose members they distribute some two-thirds of their output, and upon the practices of the merchants' associations. In very broad terms these arrangements are similar to those already out-

lined for dental goods, except that for rainwater goods common minimum selling prices are maintained both by foundries and by merchants, and that new foundry members are freely accepted, so strengthening the minimum-price provisions.

The electric-lamp industry has featured for many years as a text-book case of monopoly. Monopoly here rests on the complicated arrangements made between members of the Electric Lamp Manufacturers' Association (E.L.M.A.), producing about 60% of the total output of filament lamps and about the same of discharge lamps; in this body "two senior parties (General Electric Company and the Associated Electrical Industries Group) play a predominant role" (para. 257).[1] (Between them they are responsible for over half of the trade of E.L.M.A. members.) These arrangements, clearly set forth in the report, rest on three elements. First comes the membership of E.L.M.A., which fixes home market prices and conditions at all stages so that "anything which could remotely be regarded as price variation is prohibited" (para. 159), and enforces them by exclusive dealing arrangements not dissimilar to those in the dental-goods trade. Second comes the participation of E.L.M.A. members in a form of patent pool; the Commission considered "that up to 1939 the principal patent-owning members of E.L.M.A. regarded their patents not only as valuable in themselves but also as a collective means of defence and offence against competition from independent manufacturers" (para. 75). Third is their participation in the 1948 Lamp Agreement, the successor to the old and well-known international Phœnix Agreement, brought effectively to an end by the war. The old agreement covered a number of countries, and provided for sales quotas in each; the present agreement covers only British companies and a Dutch one, and applies only to their trading in the British Empire, excluding Canada. As before, in the areas covered British companies as a whole receive a certain participating percentage, pay a fine for supplying more than this and receive payments for deficits; and, as before, the British quota as a whole is subdivided between individual firms with the same sort of provision for fines and payments for excess or deficit. But these payments are proportionately less onerous than they were under the old agreement, though still severe. Under the Phœnix system, also, action was taken to hamper the growth of independent companies, not only by the patent arrangements already

[1] This reference, and those that follow, are to the paragraphs in the relevant Report of the Commission.

mentioned, but also by some control of materials and by the use of fighting companies operated so as to drive out new-comers.

The electric wire and cable industry has also been a text-book case, though a less prominent one than electric lamps. Monopoly here rests on the agreements joining the members of the Cable Makers Association and the Covered Conductors Association respectively, which between them supplied over three-quarters of the total supply of cables in the United Kingdom and, together with associated companies and those collaborating with them, about four-fifths. The arrangements differ from product to product, partly because of the varying percentage importance of large buyers such as the electricity authorities, the Post Office and Cable and Wireless. Generally there is agreement to establish and maintain minimum standards of quality and common standards of type and design and use a trade mark, thus not only keeping up quality but also making it difficult for outsiders not parties to the agreement to enter the field. Generally, also, there is either agreement on common selling prices and conditions of sale, together with quota systems, or the "allocation" of orders placed by public tender, whereby, often without the knowledge of the buyer, the Association decides which firm should receive the order, and tender prices are adjusted to achieve this. This used to be associated with profit pooling. In some sections, also, there are special terms for exclusive dealing.

All four industries have, then, considerable monopoly power. How has it been used? And what is its effect on the public interest? This the Commission attempt to assess, pointing out that their conclusions here must be matters of opinion. One of the factors they take into account is the profits realised as a percentage on sales and on capital; but mostly they examine more general considerations. It is impossible fully to summarise their conclusions in the space of a note; all that can be attempted is to give the more important ones, and especially those which are common to the different reports.

In all, exclusive dealing and collective boycott are condemned. In the first Report, on dental goods, it is recommended by the majority of the Commission that these practices should be prohibited by law. "Almost every practice which in our view operates or may be expected to operate against the public interest rests fundamentally for its enforcement on exclusive dealing and collective boycott" (para. 233). Two members, Mr. Grant and Mr. Wedgwood, consider it wrong to take statutory action against one industry only, since similar practices are carried on in other

industries, and since the Commission find that there has not, in this industry, been any very grave abuse of the Association's powers (para. 234). (The practices were prohibited, by Order of the Minister of Health.) This is the only specific recommendation in any of the Reports for action having statutory force; the Commission are not obliged to recommend remedies for conditions they regard as against the public interest; on this initial occasion they did so. For rainwater goods "those concerned should amend their trading arrangements in such a way as to meet" the objections the Commission had found to their operation, particularly as regards these two practices (para. 221). For this industry, as for dental goods, these arrangements were presumably the basis of most of the objectionable practices the Commission found. But the industry was subject to more competition from rival products than were dental goods. For electric lamps and for electric wires and cables the Commission recommend that similar practices should end, together with that of rebates to merchants aggregated according to total purchases from all members of the Association, but do not suggest how this should be done. For these industries, as already indicated, these practices probably do not provide the main basis for monopoly.

Indeed, for these two industries the Commission recommend the cessation of other practices designed to exclude new-comers and to hamper outsiders. They want lamp components (other than patented components and ready-coiled filaments) to be freely available to members and non-members of E.L.M.A. at prices which shall not be higher to non-members than to members (para. 267), and copper to be freely available for cables when the present Government control ceases (para. 309). They want the patent policy of E.L.M.A. to be examined afresh "if the working of the new patent policy results in an appreciable reduction of the degree of competition to which E.L.M.A. is subjected" (para. 264 (ii)). (For cables they make no recommendation on patents, as they consider the present policy of the two Associations concerned to be liberal (para. 308).) They ask "that the E.L.M.A. members should give an assurance that the Controlled Companies will continue to provide a measure of competition as suppliers of cheap lamps, and that they will not be used as fighting companies" (para. 264 (iii)), a recommendation that Mrs. Robinson regards as unrealistic so long as these companies are owned by members of E.L.M.A.; her solution is that the Government should acquire the share capital of these companies, without any necessity of changing their management (para. 296). They

criticise certain arrangements in the cable industry preventing some firms from making certain products, note with approval that some are ending and recommend the cessation of others (para. 306). For cables the Commission also examine at length the opposition which the trade association had made, on technical grounds, to the inclusion of quality requirements in the published B.S.I. standard specifications, an exclusion which had put competitors at a disadvantage. They note with approval that a compromise solution has here been arrived at for the introduction of clauses specifying the quality of the insulating material in the B.S.I. specifications for rubber cable, and recommend its extension to other cables (para. 307). Finally, for dental goods, the Commission recommend that the Amalgamated Dental Group " should reconsider its arrangements for the distribution of burs in the light of this report " (para. 219) so as not to hamper by restrictive arrangements the sale of other burs.

The Commission would also maintain competition by ending the system of sales quotas both for lamps and for insulated electric wires and cables, and the corresponding system of allocating orders for the latter, where no bulk contract is placed by a large buyer. Where it is, the Post Office should leave itself free to place orders with independent concerns, and, if any further bulk orders are placed " provision should be made to safeguard the continuance and development of efficient independent competition " (para. 318 (7)). Some of these recommendations are specific; some do not go much beyond pious hopes. For these the reader is left wondering as to whether the members of the Commission had any ideas as to how to carry out what they wished to see done.

The Commission also make recommendations on agreements to fix prices. For dental goods they see many objections to the collective enforcement of resale price maintenance (para. 229) and to manufacturers being forced, as they were, to fix end prices; though they " do not on balance see any objection in this particular trade to the individual manufacturer maintaining the end prices of his goods when he so chooses " (para. 230). As already said, their solution here is mainly to prohibit by law the sanctions of exclusive dealing and collective boycott, but also to amend the rules of the Association to which they object. For rainwater goods they are apparently prepared, if the exclusive dealing arrangements go, to tolerate the system of common minimum prices, partly because of the competition already mentioned, partly because of Government price control (para. 219).

They note that, if this control goes, the Association would be willing to submit their prices for periodic review by the Government. I say apparently, for the Commission criticise the system, as retarding low-cost methods of production (para. 220 (2)); and they do recommend that those concerned should amend their trading arrangements, so as to to meet the objections the Commission makes (para. 221). For electric lamps the Commission "do not recommend that the members of E.L.M.A. should be prohibited from continuing to fix minimum manufacturers' selling prices for agreed types of lamps sold by them to wholesalers, to retailers or to users, provided two conditions are fulfilled. These are, first, that the E.L.M.A. members should take steps to ensure that the system of exchange of technical knowledge extends to all manufacturers who are within the system of common prices, and second, that the level of the prices fixed by E.L.M.A. should be reasonable" (para. 263). They consider that the Government should review the prices from time to time, and that if in future competition should be substantially reduced, the whole question should be examined afresh. (Another example of hope?) They do recommend, however, that the system of collective enforcement of resale price maintenance by means of fines and a Stop List should be brought to an end (para. 295). For electric wires and cables they recommend that the system of common prices for rubber cable and covered conductors should be brought to an end, but, as a defence against extreme price cutting, would permit the relevant Associations to fix minimum prices giving no more than a reasonable profit to the lowest-cost producer of each type of cable, subject to a periodic review of costs and profits by the appropriate government department (paras. 282, 283, 286 and 287). Again, price agreements for the sales of telephone cable to buyers other than the General Post Office should be ended (para. 290).

For cable they also make recommendations for the cases where the Associations are faced by large buyers such as the B.E.A. and the G.P.O. They do not consider that these cases should be transformed into ordinary competition. Costs must be investigated, as they are now, and, for super tension cable "a system of purchase which is in the long-term interests both of the consumer and of the producer will have to be worked out by the B.E.A. with the industry" (para. 278). As already mentioned, the G.P.O. should also foster some competition from outside the Association.

Finally, the Commission recommend that the Amalgamated

Dental Group, which itself comes within the scope of the Act, should reduce its price for sole-agency porcelain teeth (para. 219).

There are some other recommendations of the Commission not mentioned here, but these are the main ones. Some of them, particularly perhaps those for dental goods, are fairly drastic, but in no cases do the Commission recommend the break up of the monopoly, though it might be held that the recommendations for dental goods come fairly close to this, so far as the Association's regulations are concerned. Generally, but not universally speaking, the Commission hold that the monopolistic organisations now use their power sparingly. The Associated Dental Group has, in their opinion "used with moderation the great power which it has derived from its substantial hold on the market and the support afforded to it by the restrictive practices of the A.D.M.T." (para. 216). And, again for dental goods "if we emphasise here that we have not found any very great abuse of the powers of the A.D.M.T., we must also emphasise that, in our opinion, this is a tribute to the moderation of the men who control it, rather than to the nature of its Rules and Regulations" (para. 224).

For rainwater goods, as already indicated, the power to exploit is probably limited; and the Commission are not highly critical. For electric lamps the situation is now radically different from before the war; now prices are on average moderate; before the war they "were unduly high in relation to costs" (para. 260 (i)); and there have been other changes in the system. But now and earlier the existence of E.L.M.A. has stimulated the exchange of technical information and technical progress; and prices have been progressively reduced (para. 257). For electric wires and cables the prices of each type are discussed separately and some criticised. The praise here comes for the activities of the two associations in promoting quality.

> "In an industry in which quality is of supreme importance, British cable makers have gained a reputation which is world-wide. . . . Though the production of first quality cable is by no means confined to C.M.A. companies the C.M.A. has played a predominant part in establishing the reputation and the export trade of the British industry" (para. 270).

This is praise of the Association, not of its monopolistic activities. Although the Commission do not consider many of the restrictive practices they have studied to be working against the public interest, they do not go so far as to praise them. They

may, as for electric lamps, regard them as a necessary concomitant of desirable practices such as sharing information. But beyond that they do not go.

This is true even for insulin, which, as already indicated, presents a very special case. When it was demonstrated conclusively in 1921–22 by workers at the University of Toronto that insulin, a principle secreted by the pancreas, could be used to treat diabetes, patents were taken out and assigned to the University of Toronto, who in their turn assigned the British rights to the Medical Research Council, in order that they might ensure proper conditions of production for a process which requires the greatest care and expertise. The Council licensed production by five concerns (two of which formed a partnership for this purpose) of whom one later dropped out, and arranged for compulsory testing at and scientific help from the National Institute of Medical Research. Subsequently standards were fixed by law and compliance secured through licensing authorities; consequently the patents were allowed to lapse. Imports have also been licensed, but are now insignificant. The major supplier of insulin is Burroughs Wellcome & Co., the trading name of the Wellcome Foundation, which receives all profits declared as dividends and uses them for the advancement of medical and scientific research; the other two suppliers are the A.B. Partnership of Allen & Hanbury's, Ltd., and the British Drug Houses, Ltd., and Boots Pure Drug Co.

Up to the war there was little technical collaboration, except on standardisation, which was undertaken jointly with the National Institute of Medical Research; great technical progress was made and prices substantially reduced, not always simultaneously by the three concerns, although there were intermittent " interchanges of views on prices and discounts " (para. 21). In 1941, however, in order to deal with the difficulties created by the war, the four firms concerned agreed to meet regularly as " British Insulin Manufacturers " (B.I.M.) to deal with common problems. As a result Burroughs Wellcome, on behalf of B.I.M., negotiates contracts for overseas purchases of ox pancreas (the Ministry of Food controlling home collection), arrangements are made to share out available supplies among the three concerns, close technical collaboration is organised and patents made available to all, common prices charged and discounts allowed, and a list prepared of wholesalers entitled to wholesale discount.

These are the B.I.M. arrangements that led the Commission to conclude that the provisions of the Act apply to the B.I.M. as

a whole. "The collaboration does not destroy or prevent competition, nor does it restrict competition to any substantial extent. Nevertheless, the modifying effect of the collaboration is in the direction of restricting competition between the participants . . ." (para. 93). The technical collaboration has led to a remarkable increase during the war years in the yield of insulin derived from the scarce supplies of ox pancreas; the arrangements for a wholesale list and for resale price maintenance apply to only a small proportion of total sales, since the bulk (probably more than 95%) is sold under the National Health Service; and "in view of the close technical collaboration between the manufacturers, the understanding between them that one manufacturer should not alter his insulin prices without first informing the others does not appear to us to be unreasonable" (para. 98). (This is in line with the Commission's findings about resale price maintenance for electric lamps, mentioned earlier, but without the same signs of slight misgivings as were associated with the findings on lamps.) Prices of insulin have been progressively reduced, and are probably now generally lower than in other countries. On this point comes the Commission's one suggestion. "We suggest that" the relevant Health authorities "as in effect the principal purchasers of insulin in the United Kingdom, should take note of these prices and profits and should exercise in the future such supervision as may appear to them to be necessary" (para. 98).

The Commission's final conclusions on insulin supplies are wholly favourable.

> "We have already cited . . . the opinions, commendatory almost without qualification, of a number of authorities as to the quality of British insulin and the collaboration of the manufacturers. In our opinion the present position of the members of the B.I.M. as sole insulin suppliers in this country is due principally to their efficiency, enterprise and experience. Their position is, however, supported by the technical difficulties of insulin production, the legislative requirements for manufacture and import, and the limited raw-material supplies. We find that the arrangements now made by the British Insulin Manufacturers, individually and collectively, for the supply of insulin operate and may be expected to operate in the public interest and we do not recommend that any of them should be discontinued" (para. 101).

It appears, therefore, that the Commission generally consider that actions which serve to exclude or hamper new-comers or

directly to prevent the expansion of existing firms are against the public interest. Collective enforcement of resale price maintenance they deplore, particularly because of the sanctions required. On agreements to fix prices they take varying lines, depending upon the circumstances. And they do not consider all monopolies or restrictive practices to be against the public interest, partly because sometimes no harm is done, but also because some seem to them inevitable in order to obtain such benefits of association as the sharing of technical information. For electric lamps this is of importance; for insulin it is crucial.

The Commission have therefore taken a middle line on this very controversial question. They agree neither with those who, like Sir Henry Clay,[1] apparently consider actual monopolies to be almost entirely beneficial, nor do they agree with those who would try to break up all monopolies. It is outside the scope of this note to discuss the general case for and against monopolies. But I think it would be generally agreed that, if a middle line is to be taken, the Commission have chosen the right things to try to abolish.

More doubtful are the methods they propose for ending the practices they consider against the public interest. As stated earlier, in their first Report the majority of the Commission recommend that statutory action should be taken to prohibit exclusive dealing and collective boycott; but in their subsequent reports they either leave action to the parties concerned or do not specify what is to be done. This is a very slow procedure, involving constant supervision. Moreover, for other practices, some of which have been mentioned earlier, the Commission recommend re-examination of the situation should competition be reduced in future. Once more the process is slow.

I do not think that it would be altogether fair to blame the Commission for part of this somewhat cautious approach. Even though the Act lays down a case-by-case approach and provides for the prohibition of practices found in industries investigated to be against the public interest, and there only, it is natural to feel with Mr. Grant and Mr. Wedgewood that it is wrong to enact *ad hoc* legislation against one industry only in respect of practices which are general. Clearly the majority had sympathy with this point of view in their report on dental goods. " We recognise, however, that it must be for Parliament to consider . . . whether legislation confined to this particular industry should or should

[1] " The Campaign against Monopoly and Restrictive Practices," *Lloyds Bank Review*, April 1952, p. 14.

not be enacted " (para. 233). This may well have affected their subsequent reports. If so, it is unfortunate that they have not said so. For it should be quite clear what action they would think right if it were general.

The Commission have not the same excuse for some of the vaguer recommendations they make on price control. Several times they somewhat tentatively suggest that price control or a review of prices may become necessary. But, beyond occasional remarks on costings, they never mention the difficulties involved or suggest on what basis prices ought to be fixed. Had they dealt with these points they would surely have realised and, one hopes, said that as a long-term policy price control is of very doubtful efficacy.

Again, it does not seem to me to be reasonable to blame the Commission for the slow progress of their inquiries. As has been several times emphasised in the House of Commons, it is slow compared with the scope of the problem. The Monopolies and Restrictive Practices (Inquiry and Control) Act received the Royal Assent at the end of July 1948, and the Board of Trade announced the names of eight members of the Commission early in January 1949, of whom the Chairman and one other were to be full-time members. Two additional members were subsequently appointed. In March 1949 six cases were referred to the Commission, the four, excluding insulin, on which reports have been published and the supply of machinery for the manufacture of matches and the supply and exports of matches. Since then five other cases have been referred, the supply of insulin (on which a report has also been published), the supply and exports of various semi-manufactures of copper and copper-based alloys, the printing of woven fabrics, the supply of various descriptions of imported hardwood and softwood timber and plywood, and the supply and exports of certain electric generators, electric motors and transformers and steam and hydraulic turbines for driving heavy alternators. They were chosen so as to cover a variety of practices and of industries. According to the President of the Board of Trade in July 1952, it is hoped that the report on matches and match-making machinery will be ready by the end of 1952; the Commission now produce reports at the rate of perhaps two and a half a year.[1] Such inquiries are bound to be slow, even though the staff of the Commission be strengthened and the panel system of preliminary investigation followed. For the bottleneck is the time of the Commission itself.

[1] House of Commons Parliamentary Debates, July 23, 1952, Column 569.

Action also has been slow. The Governments have accepted the recommendations, apart from one on electric lamps. The Order on dental goods was made on July 2, 1951,[1] to come into force at the end of the month, about eight months after the Report was signed. It took about a year longer to revise the rules of the Association of Dental Manufacturers and Traders. Again, for rainwater goods new rules came into force at the beginning of 1952.[2] For electric lamps the Minister of Supply announced on May 19, 1952, the Government's acceptance of the recommendations of the Commission, except for the one to cease the aggregation of quantity rebates; this was more than eight months after the Report was signed, but there had been a change of Government meanwhile. Discussions with the trade must be slow.

Criticism must be directed mainly at the piecemeal policy laid down in the Act. Individual investigations had to be the first stage. Later the Board of Trade may, under Clause 15 of the Act, require the Commission to report on the general effect on the public interest of practices of a specified class, provided such practices have been dealt with in previous individual reports. The President of the Board of Trade has stated that he intends to ask for such a general report, possibly covering exclusive dealing and collective boycott.[3] Any action following such a report would, of course, require legislation, and would cover only one aspect of the field. As the reports have shown, and as indeed is well known, there are many other devices to hamper new-comers; some of them have been dealt with by the Commission and could, therefore, presumably be included in the general reference. It is to be hoped that the reference will be as wide as possible[4]; the least that is required is an examination of practices designed to exclude new-comers; and any legislation, to be effective, would have to be widely drawn.

Probably such an inquiry would not fall within the field of the existing Act. The Royal speech of October 1951 promised "a measure . . . for strengthening and widening the activities of the Monopoly Commission." This was not produced in that

[1] S.I. 1200, 1951.

[2] House of Commons Parliamentary Debates, July 23, 1952, Column 571.

[3] House of Commons Parliamentary Debates, July 23, 1952, Column 572.

[4] The Parliamentary Secretary to the Board of Trade announced in the House of Commons on December 19, 1952, that a general report under Section 15 of the Act had been asked for from the Commission. Broadly the Commission were to report on practices which involved agreement amongst a number of traders to discriminate in favour of or against a defined class of customers. For the full reference see *Board of Trade Journal*, December 27, 1952, p. 1233.

session, nor promised for the next in the Royal speech of November 1952. If time is ever found for it it ought to at least to make such inquiries possible.

Even if this were to be done, there would remain other condemned practices, such as sales quotas, and other more doubtful ones, such as agreements to fix prices. And the price-fixing activities of large concerns would not be touched. The task, as at present handled, has hardly been begun.

There remains, however, one hope of more rapid action. Has the mere establishment of the Commission led organisations having monopoly power or using restrictive practices to operate less against the public interest than they used to do? There is some evidence of this in the reports. The clearest is for electric lamps. The prices of the most popular types of E.L.M.A.'s general-service filament lamps in 1939 were 1*s.* 9*d.* for clear lamps and 1*s.* 7*d.* for pearl lamps; these remained unchanged throughout the war and were reduced in July 1945 to 1*s.* 3*d.* for both " as a result of negotiations initiated by the Board of Trade " and to 1*s.* 1*d.* in July 1949.

> " We have no hesitations in accepting that E.L.M.A.'s action on this occasion was influenced very largely by 'political considerations' such as the continuing interest of Government Departments in the members' costs, speeches critical of E.L.M.A. made during the Parliamentary debates in 1948 on the Monopolies and Restrictive Practices (Inquiry and Control) Bill, the fact that the lamps industry was one of the first industries referred to us for investigation and, more generally, the increased public interest in the economic significance of trade combinations of which the setting up of this Commission was, in part, a consequence " (para. 202).

Other changes in the right direction were also made in the E.L.M.A. system during or since the war. There are also examples in the other reports. How far these were due to changed economic circumstances, how far to " political " reasons, the Commission do not attempt to say. Nor, of course, can they say how far similar changes have been made in industries not already referred to the Commission. Until there is clear evidence that this has happened one cannot be too optimistic about the present British policy towards monopoly.

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The United Nations Report on the Economic Development of Under-developed Countries [1]

Although this widely publicised report is a brief document, it deals with important issues. It purports to analyse the forces which influence economic development, and puts forward recommendations designed to accelerate it in regions which include rather more than three-quarters of the population of the world.

The report is divided into four parts. The first is introductory, consisting of one chapter which expounds the terms of reference and another which discusses unemployment and economic development. The second part, of seven chapters, discusses measures "which the under-developed countries can take on their own initiative to help themselves," while the third deals with assistance from the developed countries. A final part summarises the recommendations.

I

The first chapter admits that the authors had "some difficulty in interpreting the term 'under-developed countries.'" They decided to use it to mean "countries in which *per capita* real income is low when compared with the *per capita* real incomes of the United States of America, Canada, Australasia and Western Europe." Thus, in accordance with current usage, the whole world is regarded as under-developed except for a few comparatively wealthy countries. It is not specifically stated how the U.S.S.R. and Eastern Europe are to be classed; they are nowhere mentioned in either category. The inclusion of three-quarters of the world in one broad category can be seriously misleading; there are fundamental differences between regions of sparse population, barely above tribal levels and based on shifting agriculture or pastoral cultivation, and others which are in close contact with the western world, with settled populations and methods of agriculture (though these may be backward and even retrogressing) and distinct cleavages of class and wealth. Entirely different again are the overcrowded lands of Asia, some with thousands of years of advanced culture and civilisation behind them.

[1] *Measures for the Economic Development of Under-developed Countries.* Report by a Group of Experts appointed by the Secretary-General of the United Nations. (United Nations, 1951. Pp. ix and 108. 5*s*.) All references are to this report. The group was composed of: A. B. Cortez (Chile); D. R. Gadgil (India); G. Hakim (Lebanon); W. A. Lewis (United Kingdom); T. W. Schultz (United States).

The common feature of these various regions is the absence of scientific techniques applied to industry and agriculture, together with a low level of capital and of real income per head. But this feature is not the result of any single set of causes; in different places and regions it reflects an enormous variety of circumstances, historical experience, potentialities of development, political conditions and so forth. To disregard these differences is to assume away the very essence of the problem both of analysing and of promoting economic development. This approach is particularly inadequate in a discussion which, as in this report, fails to distinguish between analysis, forecast and recommendation. It also involves neglect of the fact that some of these regions, such as Malaya and West Africa, have been developing exceptionally rapidly during the last few decades, and that many of their economic, social and political problems arise from this, and not from stagnation. This, indeed, is typical; throughout the report there is a disregard of the historical processes of development, and nowhere does it describe or examine any specific case of actual development.

II

It is significant that discussion opens with a review of unemployment (including disguised unemployment) as a principal problem of the under-developed countries. It is recognised, of course, that the unemployment of the under-developed areas arises from lack of co-operant factors of production, and not from lack of effective demand. Although there are large areas in which unemployment does not arise, it is undoubtedly a major factor in many others, especially in Asia and parts of Europe and of Africa.[1]

The report states that this type of unemployment does not affect wage labour, but is associated with family employment. This is misleading, for it ignores the effects of the level of wages in limiting employment opportunities for hired labour. A striking feature of many under-developed countries is the high level (high by comparison with transfer earnings) at which wage-rates for hired labour are maintained by institutional arrangements (by international pressure, national governmental measures or trade-union action) at the same time as large numbers are unable to find work. Those who fail, have perforce to fall back upon

[1] This form of idleness is also present in purely subsistence economies, but there it tends to be regarded as part of the nature of things.

family or self-employment in agriculture or petty trade, domestic service and so forth, in which there is no lower limit to earnings. The comparatively high wage-rates discourage the growth of activities which rely on hired labour, *i.e.*, principally manufacturing industry and the more advanced forms of transport; conversely, they encourage and subsidise (if they do not actually enforce on a certain section of the population) the pursuit of activities which do not use hired labour, or in which these high wages are not enforced. They also tend to discourage the influx of capital into these areas and to retard its growth, while encouraging capital intensive methods in activities relying on hired labour, thus retarding development and aggravating unemployment.

Industrialisation is said to be the most promising, or even the only, remedy for unemployment :

> " Where more land can be brought into cultivation this will afford some relief but in most countries where underemployment is acute, nearly all the cultivable land is already cultivated. Effort has then to be concentrated upon creating new industries off the land, of which manufacturing industries comprise the largest and easily the most promising category. Thus, the most urgent problem of these countries is industrialisation " (para 21).

This neglects the possibility of more intensive agriculture, with changes in agricultural methods bringing about higher incomes for a given (or even an increasing) agricultural population. This has been a frequent means of economic development. Obvious examples include the growth of settled agriculture, the reduction in shifting cultivation, the improvement of productivity through irrigation and the establishment of plantation crops. With technical improvements in food preservation and processing (especially the development of canning) and in transport, it has become possible to cultivate for sale in distant markets the previously perishable products of intensive agriculture. There is every likelihood of further improvements in this sphere.

But even with existing techniques, intensive agriculture may at times offer more scope for development to many areas than industrialisation. The distinction between cultivable and uncultivable land is not so clear as is implied, and land previously regarded as uncultivable can often be cultivated with less capital expenditure than that needed for industrialisation, but with an equal volume of employment. Here again the extension of the cultivable area through irrigation is only the most obvious of

several possibilities which include flood control, large-scale draining and so forth. Irrigation has greatly extended the effect of cultivable area in many under-developed countries. India and Egypt are familiar examples. The spread of cotton cultivation on irrigated land in Syria is another recent example.

It is, therefore, invalid to suggest that throughout the under-developed world under-employment can only be substantially corrected by industrialisation.[1]

III

The second part of the report opens with a three-page chapter on the social and political pre-conditions of economic development. The institutional background is, indeed, of great importance. Many of the institutional factors which modern economic analysis regards as data are, in fact, primary determinants of the long-term growth of an economy; and the particular institutional elements and possibilities of a locality can have a profound influence on the rate and character of its development. The report mentions some of these elements, and has some interesting asides on the influence of systems of land tenure, of the legal framework, and of the attitude of the population. In every case, however, they are limited to general remarks.

Certain other ideas, already widely prevalent, are central to the report. These are that inequality and privilege act as major obstacles to development, and that their abolition, coupled with the arousing of mass enthusiasm (in itself likely to result from the abolition of inequality and privilege) are primary conditions of development. Two quotations will serve to indicate this line of thought:

> "To begin with, in any society inequalities of wealth may deny equality of opportunity to the greater part of the population, and keep ignorant many persons who, given the opportunity, would contribute to raising the national income. This is at its worst where the society is stratified by caste, colour, or creed, and where whole sections of the populations are deprived of opportunity by law, by custom, or by chicanery" (para. 33).

[1] These criticisms are independent of (and are reinforced by) the neglect of the effects on development of the maintenance of wages in paid employment far above earnings in alternative occupations, and are also independent of the effects of restrictions on migration and movement of development which are discussed below. They are further reinforced by the possibility of long-term changes in the terms of trade in favour of agricultural producers.

> "In our judgement, there are a number of under-developed countries where the concentration of economic and political power in the hands of a small class, whose main interest is the preservation of its own wealth and privilege, rules out the prospect of much economic progress until a social revolution has effected a shift in the distribution of income and power" (para. 37).

Restrictions based on colour, race and creed undoubtedly play a part in retarding advance in a number of under-developed countries, of which the West Indies, South Africa and parts of East and Central Africa are probably the most important; but these comprise only a small proportion of the under-developed world.[1] For others the reverse is the truth; the fortunes and incomes of the richer members of the community have been acquired as a return for their participation in, and promotion of, economic development. The wealth of the Chinese merchants, tin-miners and rubber-estate owners of South-east Asia, most of whom were almost destitute recent immigrants, can hardly be said to be the result of privilege. Nor has their accumulated wealth retarded development; it is a return for the contribution to economic development, a return the prospects of which often act as an incentive to work, to save, to undertake risk and even to undergo hardship. It may be argued that the return was in some cases unnecessarily high; but it was certainly not the result of privilege nor an obstacle to development. Much the same could be said of Levantine merchants in West Africa, of the Indian population of East Africa, and of the British, American and European merchants, planters and miners in South-east Asia, Africa and South America.[2]

Quite apart from its questionable analytical validity, this reasoning may have adverse practical results on economic development. The relative importance to be attached to the distribution of the national income as distinct from its size is a value judgment. But at an early stage of economic development pre-occupation with egalitarian ideas may serve to retard the growth of real

[1] The obstacles to migration and the hostility to minority groups (for instance in India) are far more important; but these are not the problems the authors have in mind.

[2] The problem of immigration receives only one paragraph in the whole report ending "we do not feel that there is any recommendation that we can usefully make on this subject" (para. 144). Yet restrictions on immigration and migration are a prime factor in restricting economic growth in certain under-developed countries, where local pressure groups representing often a tiny fraction of the population have succeeded in erecting barriers to immigration and even to internal migration which would have accelerated economic growth.

income, including the real income of the poorer classes. This is especially probable because the practical results of this preoccupation usually take the form of barriers to immigration and internal migration, as well as discrimination against imported capital, confiscatory taxation, the imposition of minimum wages at levels retarding the growth of industrialisation and so forth.

The importance of arousing mass enthusiasm is a recurrent theme of the report :

> " If the leaders are reactionary, selfish and corrupt, the masses in turn are dispirited, and seem to lack initiative. But if the leaders win the confidence of the country, and prove themselves to be vigorous in eradicating privilege and gross inequalities, they can inspire the masses with an enthusiasm for progress which carries all before it " (para. 38).
>
> " As we have pointed out several times, to secure rapid economic progress involves capturing the enthusiasm of the masses for improvement and making new knowledge available to them directly. This can happen only if hope is held out to them of progressive attainment of a just social order. To arouse their enthusiasm is a matter of popular political leadership " (para. 94).

Not only is there a singular lack of evidence for this view, but all past experience points the other way. The capturing of mass enthusiasm certainly played no important part in the development of Great Britain, the United States, Canada, Germany, Japan, Australia, New Zealand or any of the countries regarded as developed by the United Nations experts; it has also been absent in the development of West Africa and South-east Asia. The desire to accumulate wealth and the ability to perceive and exploit opportunity have indeed played a vital part in economic development the world over; but this is quite different from mass enthusiasm.

The restrictions which are really important in retarding development are not those of inequality, caste, race and the like, but of a kind which receive but little attention in the report. They are those which frequently emerge in a specialised society, in which individuals or groups can increase their scarcity value by limiting entry into their own, and allied, fields of activity. Although they may often masquerade as expressions of national and racial sentiment, they are in fact frequently economic in essence. For political, national and administrative reasons, it is often much easier to direct such measures against foreigners and strangers. In the under-developed countries they usually take

this form; but they are also often directed against other members of the local population, and are therefore clearly the result of economic restrictionism rather than of zenophobia. It is this kind of restriction, designed to assist political, national, sectional groups of the local population which is at present an important obstacle to economic development over most of the under-developed world.

The most important restrictions are those on immigration and internal migration, which are now almost universal in the under-developed world. In the past, immigration has played a primary part in economic development, by supplying missing resources, introducing new techniques, stimulating new wants, creating fresh attitudes and bringing new commodities within reach of the local population. Restriction here is most harmful where there are over-populated areas side by side with regions where land is plentiful but semi-skilled or literate labour is relatively scarce; in such conditions restriction on movement enhances unemployment in both regions. The obstacles to movement of the Ibo in Nigeria provide an example. In some areas, where the populations are heterogeneous, these tendencies may result in widespread fragmentation of the economies.

IV

From the pre-conditions of economic development, the report turns to consider some questions of economic organisation. These are a miscellaneous collection, but the general theme is that "economic progress depends to a large extent upon the adoption by governments of appropriate administrative and legislative action, both in the public and private sectors" (para. 39). Land tenure and compulsory standardisation are treated at some length, and raise questions of special interest.

Because of the small amount of land per head in some of the under-developed countries, its most fruitful cultivation is of crucial importance. Systems of land tenure are obviously relevant. According to para. 56 of the report:

> "In many under-developed countries, the cultivators of the soil are exploited mercilessly by a landlord class which performs no useful social function. This class contrives to secure to itself the major part of any increase in agricultural yields, and is thus a millstone around the necks of the tenants, discouraging them from making improvements in agriculture and, in any case, leaving them too little income from which they might save to invest in the land. In

such countries land reform, abolishing this landlord class, is an urgent pre-requisite of agricultural progress."

Leaving aside the appropriateness of such remarks in an expert report, they disregard important problems of analysis and policy. The experts rightly emphasise the need for protection of the tenant; but they also desire the enforcement of rules of good husbandry. There is a danger that this will be interpreted in purely physical terms (judging it by reference to physical output only, irrespective of the quantity of resources used), and lead to waste which these countries can ill afford. Particular difficulties are presented by the rise of new crops. The tenant may cultivate his holding satisfactorily, but produce crops which are commercially less valuable than others which could be grown on the land; this problem is specially presented by the emergence of profitable cash crops in a country where most of the tenant cultivators are subsistence farmers unwilling to abandon their traditional crops or methods. The resulting dilemma is obvious; its solution is not.

This has a bearing on rents. The experts severely condemn those landlords who skim off the increases in value of the produce of the land. But they fail to state that a measure of differential rents, and possibly a large measure, may be necessary to secure the most economic and efficient use of land. In communities used to traditional systems of land tenure and methods of cultivation, and confronted with the rapid emergence of profitable cash crops, formidable problems are presented by any attempt to achieve more efficient use of land without discouraging cultivators or causing social disruption. These are problems on which the experts might have been expected to have contributed something of value; they are not so much as mentioned.

V

In Chapter VI we come to what is regarded as one of the key factors in development, the formation of capital. Much of the discussion of domestic capital formation is affected by neglect of the most important form of investment in under-developed countries. There is no reference to the substantial and successful capital formation by small cultivators in the development of many branches of agriculture. Yet some of the most striking instances of rapid economic development in the course of the last century have resulted from the establishment of innumerable agricultural properties, often of a type not yielding a return for six or seven years after their first establishment. Tea, rubber, coffee, cocoa, cotton and kola-nuts are obvious examples of crops

which have involved much investment by the local populations in the establishment of millions of smallholdings and small plantations.[1]

The increased saving which is needed for domestic capital formation is regarded as likely to require compulsory reduction of consumption, and it is taken as axiomatic that this must be at the expense of the wealthier classes.

> "People of middle and higher incomes in many under-developed countries are well known for their tendency to conspicuous consumption, and there is no doubt that a fall in their consumption would be in the public interest. It is not, however, easy to achieve. The middle classes have an important part to play in making and executing development programmes, whether as administrators, as scientists or as private entrepreneurs. Governments have therefore to step warily in attempting to reduce the consumption of the middle classes, lest the effect be to inhibit development."
>
> "Reducing the consumption of the wealthiest classes seldom raises this particular difficulty. It is not, however, easy to achieve simply by taxing them, since their reaction to taxation is more to reduce their savings than to reduce their consumption. . . . It is necessary also to use controls which ration luxury consumption, such as import controls, and special taxes on luxuries" (paras. 111 and 112).

Although, when dealing with the middle classes, governments have to step warily, it is implicitly assumed that taxation of the wealthiest classes will not affect the incentive to work, save, invest or to bear risks. Nor is the type of resource absorbed by the consumption of different classes considered. In many under-developed countries the most obvious example of conspicuous consumption is the maintenance of a large number of servants and retainers and the possession of several wives. These are cheap because of the absence of other forms of employment; setting them free would not accelerate economic development.

Moreover, in these countries the use of direct controls to secure a reduction in consumption tends to create windfall profits and unearned incomes; a large proportion of the controlled commodities moves into consumption at prices much higher than those at which they were allocated by the authorities, and yields wind-

[1] The estimate that net capital formation, including foreign investment, in most under-developed countries is "not as high as 5% of the national income" probably excludes investment in small agricultural properties. This figure is contrasted with one of 10% of national income for "most countries where rapid economic progress is occurring."

fall profits to intermediaries or to those to whom the commodities are allocated at controlled prices.

In certain of the under-developed countries, notably West Africa and Uganda and to some extent Malaya, recent years have seen heavy forced saving by peasant cultivators through the operation of the marketing boards and stabilisation funds, by which part of the sale proceeds of the crop are withheld. There is a brief reference to these boards and funds, but nothing is said about their insensible development into a mechanism of taxation. The report equally neglects the effects of these measures on the willingness and ability of producers to maintain and expand their activities. In the past, the large tropical peasant industries have arisen in response to favourable prices, and the question of incentive is still relevant.

Adequate discussion of capital formation would have to take account not only of the general level of accumulation, but also of its composition and of the sources and channels of its supply. All this is entirely neglected. There is a greatly over-simplified approach to the relation between the growth of capital and economic development. It is assumed that the latter is a simple function of the former. Even a cursory examination of any actual case of development would have shown that this is superficial, and that, if a broad generalisation were desired, it would be truer to say that capital is created in the process of development than that development is a function of the creation of capital.

VI

The measures which require the co-operation of advanced with under-developed countries occupy Part 3 of the report. The report expresses concern over the secular movements of the terms of trade between under-developed territories and more advanced countries :

> " The terms of trade between primary and manufactured commodities entering into international trade moved against primary commodities for the sixty years between 1873 and 1937."

It is not mentioned that for considerable periods within this span of time the movement was in the opposite direction. Moreover, the effects of technical progress are neglected. If technical advance has been relatively more rapid in the production of primary commodities, an apparent deterioration in the terms of trade of primary producers may be consistent not only with a rise

in their real incomes, but even with a relative improvement in their position. This was certainly the case for many important primary products entering into international trade over the period considered.[1]

The most specific recommendations of the report come in Chapter XI, which proposes large-scale transfer of capital from developed to under-developed countries, largely through official inter-governmental loans and gifts. The basis of the argument is that the resources of the under-developed countries are insufficient to stimulate and sustain economic development, especially the mass transfer of labour from agriculture to industry which is envisaged by the experts as the necessary condition. It is estimated that the under-developed countries require a minimum annual capital investment of approximately $19 billion in order to raise their *per capita* income by 2% a year; of this total, over $10 billion would have to be provided by the advanced countries.

The calculation is based on an assumed shift of 1% of the total working population annually from agriculture into industry, and on increases of investment in agriculture. A calculation in such broad terms, based on concepts which have been evolved primarily for industrial societies (and which have only limited meaning even for those), and put forward for years ahead in terms of averages for three-quarters of the world, can have very little real significance.

It is supported by arguments which are not at all convincing. It is stated, for example, that $19 billion annually is substantially less than the present rate of investment in the United States, " for a population one-tenth the size of that which we are considering and for an economy which is already highly developed " (para. 241). It is not stated, however, that it is the technical knowledge, the attitude of the population and the resources of the United States (*i.e.*, the factors which are responsible for its being a highly developed country) which make it possible for this amount of investment to be usefully absorbed. Absorptive capacity depends largely upon the supply of co-operant factors, the state of technique, the attitude of the population, the political system and a series of other factors whose absence makes it difficult to employ

[1] Some of these products, for instance rubber, developed from being wild products into leading plantation crops. The production of cocoa spread into new areas with entirely different cost conditions from those in the areas from which it was exported sixty or seventy years ago. The same applies in varying degrees to such important products as sugar, coffee, sisal, copra and many others.

large amounts of capital to good purpose; all these are dismissed cursorily with the remark that the experts are not impressed by arguments about the limited ability of the under-developed countries to absorb capital.

It is observed that the real return on capital in the under-developed countries may at times be less than it is elsewhere. Thus, the report states that in 1948 the average rate of return on the United States foreign investments was about 17% and on domestic investments 14%; it is observed that "many under-developed countries feel that this is too high a price to pay for capital" (para. 255). In other words, it is presumably the duty of the advanced countries to provide capital for kinds of development which yield a lower return than those which are already being pursued.

The views of the experts on the return to capital are, indeed, somewhat ambiguous. At times it appears that the low level of development in the countries must mean that the real return on additional investment should be high; at other times, however, it seems that the return cannot compete with that obtainable in the United States and elsewhere. The obvious fact, of course, is that this degree of generalisation is misleading; *some* projects in the under-developed countries will yield higher returns than are obtainable in the West, whereas others will give lower returns, if any at all.

It is recognised that capital on the scale envisaged would have to come largely from official sources. The discussion on the place and possibilities of private investment (paras. 250–61) is difficult to follow. Investment in shares of companies operating in under-developed countries is not considered; yet this has been the chief method of development of some of the advanced countries of to-day. It is not clear whether private investment would be regarded as desirable either by the experts or by the governments of the under-developed countries. It seems to be considered extravagant to pay a price for capital comparable to what it could get at home. In general, there is a strong preference for officially provided capital, which reaches its logical conclusion in the proposal that "some mechanism be created for transferring from the developed to the under-developed countries, by way of grants-in-aid, a sum of money which would increase rapidly, reaching eventually a level of about $3 billion a year" (para. 271).

In view of this, it is not surprising to find the experts criticising the International Bank, which has been lending only a few hundred million dollars a year—"in view of the need of the under-

developed countries for capital the Bank cannot be said to be meeting the challenge of circumstances" (para. 264). The experience of the Bank in handling the difficult problems of lending to under-developed countries is ignored. The experts take the sanguine view that the transfer of enormous sums should not strain either the resources of the industrial countries which have to lend (or give) them, or the economic and social fabric of the under-developed countries which are to absorb them.

Underlying the whole of the discussion in the report is a much too mechanistic and simple view of the relations between the supply of capital, economic growth and the increase of real income. Although a high level of income is associated with a high level of capital per head, it does not follow that heavy investment in the form of inter-governmental transfer of capital would rapidly raise the incomes of under-developed countries, still less that it would yield real returns comparable with those obtainable in the West. The problems of the stimulation of the flow of capital and resources generally (including personnel and enterprise) into under-developed countries are formidable. It is of great importance that solutions to them shall be found, for the spread of medical knowledge and improvements in public health are certain to raise the expectation of life and therefore to increase the predicament of these countries.

But worthwhile consideration of these problems and of their possible solution (including that of the role of government in the promotion of economic development) requires specific and thorough discussion on a level different from that of this report.

It is perhaps doubtful whether economists in their professional capacity are able to make recommendations, the acceptance of which would significantly accelerate economic development. But they can do so, if at all, only after careful and patient examination and analysis of situations. Exaggerated belief in its possibilities has debased our subject: its standing is too high and its standards are too low.

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CURRENT TOPICS

WE offer our most sincere congratulations to Sir Dennis Robertson, a recent President of our Society, on the conferment of the honour of Knight Bachelor in the New Year's Honours List.

WE record with deep regret the death, recently reported from Sweden, of Professor E. F. Hecksner, well known in this country for his great study of Mercantilism and for numerous other writings. We offer to his family our sincerest sympathy.

THROUGH an error, for which Dr. Stark was not responsible, Table I in *Jeremy Bentham's Economic Writings*, Volume II, which should have been inserted between pp. 224 and 225 as a folder, glued along its left-hand edge, was bound in as pages between 222 and 223, making the notes on its back, which relate to Table II, unintelligible. If any owner of a copy of this volume would wish to have another copy of Table I to insert in the proper place, will he please write to the publishers, on behalf of the Royal Economic Society, Messrs. George Allen & Unwin, Ltd., 40 Museum Street, London, W.C.1.

THE Secretary of the Royal Economic Society would be glad to hear from any Fellows who may have for disposal either complete runs of the early issues of the ECONOMIC JOURNAL or isolated volumes or copies of issues prior to the beginning of 1920. Several libraries are anxious to obtain a complete set beginning with the first volume, issued in 1891. The Royal Economic Society possesses stock only of certain issues, and would welcome the opportunity of purchasing small numbers either of complete runs or of issues that are missing from their stock. Letters should be addressed to The Secretary, The Marshall Library, Downing Street, Cambridge.

RECENT PERIODICALS AND NEW BOOKS

Journal of the Royal Statistical Society

VOL. CXV, PART IV, 1952. *Statistics of Tins and Cans :* J. RYAN. *Index Numbers of Wage-rates and Cost of Living :* A. L. BOWLEY. *An Exercise in Errors :* A. D. ROY. *A Criterion of Efficiency in Local Administration :* K. S. LOMAX. *Employment in Shipbuilding and Ship Repairing in Great Britain :* N. S. ROSS. *Statistics Relating to the Petroleum Industry, with Particular Reference to the United Kingdom :* A. L. KING.

Economica

VOL. XIX, NO. 76, NOVEMBER 1952. *The Classical Monetary Theory : The Outcome of the Discussion :* G. S. BECKER and W. J. BAUMOL. *The Evaluation of Federal Grants :* A. D. SCOTT. *A Note on Railway Constructional Costs 1825–1850 :* H. POLLINS. *Price Changes and the Stability of the Balance of Trade :* W. BECKERMAN. *Some Questions about Ricardo :* T. W. HUTCHISON.

The Economic History Review

VOL. V, NO. 1, 1952. *Economic Fluctuations and some Social Movements since 1800 :* E. J. HOBSBAWM. *The Long-term Rate of Interest and the Price of Land in the Seventeenth Century :* H. J. HABAKKUK. *The Abolition of Runrig in the Highlands of Scotland :* M. GRAY. *Economic Attitudes in Liverpool, 1793–1807 :* S. G. CHECKLAND.

The Journal of Economic History

VOL. XII, NO. 3, SUMMER 1952. *The Inside Contract System :* J. BUTTRICK. *Adolf Hitler and German Heavy Industry, 1931–1933 :* G. W. F. HALLGARTEN. *Some Classical Economists, Laissez Faire, and the Factory Acts :* L. R. SORENSON.

The Political Quarterly

VOL. XXIII, NO. 4, OCTOBER–DECEMBER 1952. *Something New Out of Africa :* L. WOOLF. *Taxation Policy :* D. JAY. *Redistribution of Wealth :* K. PANTER BRICK. *Korea—Its Place in History :* E. JOAN PARR. *Choosing the Presidential Candidates :* D. C. WILLIAMS. *British Parliamentary Government Today :* R. BASSETT. *The Problem of Land Values and Town Planning :* H. J. J. BROWN.

The Review of Economic Studies

VOL. XX, NO. 51, 1952–3. *Demand, Supply and the Price Level in Macro-Economics :* H. ROSE. *External Economies and the Supply Curve :* R. W. ADAMS and J. T. WHEELER. *A Comparison of Organisation Theories :* H. A. SIMON. *Estimating Departmental Intervention :* E. NEVIN. *The Production Function in Leontief Models :* B. CAMERON. *The Future of the United Kingdom's Long-term Contracts :* W. BECKERMAN. *Mr. Gottlieb on Marx : a comment :* R. L. MEEK. *Mr. Graaff's Producer–Consumer Theory : a restatement and correction :* R. W. CLOWER.

The Journal of Industrial Economics

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1952. *The Character of Puritan Revolution :* E. TOKUMASU. *Mathematical Development of Labour Theory of Value :* S. KOSHIMURA. *Ueber die Kameralistische Idee als Urgestalt der deutschen Sozialwissenschaft :* S. MUTO.

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VOL. 3, NO. 3, JULY 1952. *Accuracy of the Price Index Numbers :* Y. MORITA. *Leontief System and Production Function :* I. YAMADA. *A Note on Prof. I. Yamada's Article :* H. IEMOTO. *The Birth of the Labour Theory of Value :* S. MATSUKAWA. *On the Political Economy of Backwardness :* P. A. BARAN.

VOL. 3, NO. 4, OCTOBER 1952. *On the Demonstration of the Theory of Crisis in Marx's "Capital" :* KOZO UNO. *Transition from the Ancient to the Middle Ages :* SHIRO MASUDA. *An Observation of the Marxian Reproduction Scheme :* MINORU OKA.

The Annals of the Hitotsubashi Academy

VOL. II, NO. 2, APRIL 1952. *On the Insurable Interest :* Y. KATO. *Business Cycle and Capitalism, Schumpeter vs. Marx :* S. TSURU. *Conditions for Direct Taxation :* M. KIMURA. *Two Kinds of Labor Management :* S. MOHRI. *Outlines of Japanese Policy in Indonesia and Malaya during the War :* Y. ITAGAKI. *Law of Criminal Evidence in Japan :* K. TANAKA. *Parricides in Japan :* T. UEMATSU. *Two Types of Medieval Cities in Western Europe :* S. MASUDA.

Statisztikai Szemle (Hungarian Text)

SEPTEMBER 1952. *Better Qualified Statisticians for Better Statistics ! Statistics in the Service of Progressively Developing Production :* F. SCHIEN. *Some Questions of Statistical Theory :* N. MIKHAILOV. *The Analysis of the Fulfilment of the Production Plan :* Z. ROMÁN. *Current Questions in Trade Statistics :* S. PARTIGUL. *The Distribution of Electricity to Industrial Enterprises :* F. SPERKEL. *The Falsification of the Cost of Living Index in the U.S.A. :* L. TSYRLIN. *Hungarian Book Publishing Statistics :* E. SZABÓ.

OCTOBER 1952. *The XIX Congress of the Soviet Communist Party. Raise the Level of Statistical Work :* G. PIKLER. *Concerning the Objects and Methods of Statistical Science :* I. PISAREV. *The Application of Constant Prices to Hungarian Enterprises :* G. BAĆS. *The Statistical Registration*

of Industrial Investments put into Operation : L. LENGYEL. *Experience Derived from 1952 Threshing Work :* I. OROS. *Statistical Verification of Precautionary Maintenance Repairs :* J. VARGA. *The New Tasks of Material Supply :* T. SZIRA.

NOVEMBER 1952. *Measures to Raise the Standards of the Local and Municipal Inspectorates of the U.S.S.R. Statistical Administration. Some Problems concerning Production in the Construction Industry :* O. LUKÁCS. *The Science of Statistics :* V. CHERMENSKY. *The Statistical Service of the Ministry of Light Industry :* B. LACZAI. *Factors Affecting Personally-held Cash Balances :* G. SZÖNYI. *The Economic Expansion of American Imperialism since the War :* M. DOBROV. *A Criticism of the University Textbook " General Statistics " :* G. BOROS, I. HUSZÁR and L. OLLÉ.

Voprosy Ekonomiki (*Russian Text*)

No. 9, 1952. *Draft of the Fifth Five Year Plan. The First-born of the Great Projects of Communism :* YA. RAPOPORT. *A Striking Document of Creative Marxism–Leninism :* R. DADYKIN. *The Steady Rise in Workers' Living Standards in a Socialist Society :* K. KOSHELEV. *The Post-war Development of the U.S.S.R. Construction Industry :* A. ROTSHTEIN and E. TYAGAN. *The Science of Statistics :* V. CHERMENSKY. *The Economic Views of N. P. Ogarëv :* V. MARTYNOVSKAYA. *The Italian Working Class in the Struggle for Peace and Democracy :* S. SLOBODSKY. *Bourgeois Economists in the Service of Militarism and War :* I. BLYUMIN.

Planovoe Khozyaistvo (*Russian Text*)

No. 4, 1952. *Draft Directives Concerning the Fifth Five-year Plan for the Development of the U.S.S.R. during 1951–55. The Nineteenth Congress of the Great Party of Lenin–Stalin. The Economic Significance of the Volga–Don Ship Canal :* YU. KOLDOMASOV. *Reserves for the Over-fulfilment of Plan in Ferrous Metallurgy :* A. DANCHENKO and V. NIKONOV. *Means of Consolidating Cost Accounting and Financial Control in Construction :* P. PODSHIVALENKO. *National Economic Planning in the European People's Democracies :* P. KRYLOV. *Material Balances and their Rôle in Planning the National Economy :* M. KOZIN.

Financy i Kredit S.S.S.R (*Russian Text*)

No. 1, JULY 1952. *Finance and Credit in the Service of Building Communism. The Financing of the Great Projects of Communism :* P. PODSHIVALENKO. *Strengthen the Financial Control System in the National Economy :* I. SLAVNY. *Profits and the Turnover Tax—Instruments for the Distribution of the National Income of the U.S.S.R. :* A. BACHURIN. *Overfulfil the Plan for Budget Receipts :* A. KRIVENKO. *To Carry out in an Exemplary Fashion the Finance and Accounting of State Procurement :* G. KOVALENKO. *Ensure in Good Time the Collection of the Agricultural Tax :* D. BURMISTROV. *Increase the Velocity of Circulation of Funds in Accounting :* A. IVANOV. *Important Sources of Cash Reserves :* A. BOLSHAKOVA and I. YAGODIN. *Reserves for Lowering the Cost of Production in Industry :* L. ELYASHEV. *Raising the Efficiency of Control Measures is the Most Important Task of the Long-term Investment Banks :* B. SAVIN. *The Efficiency of Bank Control by the Rouble :* Z. KASHIRKINA. *Improve Accounting between Economic Organs* (*Symposium*). *The Aggressive Character of the New U.S.A. Budget :* M. TARASOV.

No. 2, AUGUST 1952. *Under the Banner of the Party of Lenin–Stalin, Forward to the Victory of Communism ! Money in the Service of Building a Communist Society in the Soviet Union :* K. PLOTNIKOV. *The State Bank and the International Accounts of the U.S.S.R. :* M. POLYAKOV and B. TRUBENKOV. *Do Not Relax Attention to the Promotion of the State Loan :* P. DMITRICHEV. *Impending Tasks in Financing Trade Turnover :* V. VABRESYUK. *Checking Fulfilment is the most Important Duty of Financial Institutions and Banks :* G. DARKOV. *Finance and Credit—a Powerful Lever for the Economic Development of the Chinese People's Republic :* B. BOLDYREV. *Enterprises and the Budget :* B.

KRICHEVSKY. *Towards an Economy in Administrative Expenses:* P. PSHENICHNY. *Bank Control of the Rouble in Fisheries:* M. INGERMAN. *Improve the Credit Accounting Services of Economic Organisations:* M. YEVSTYUKHIN. *The Regulations on Norm Fixing for Industrial Enterprises' Own Circulating Capital:* L. ROTSHTEIN.

No. 3, SEPTEMBER 1952. *On the Eve of the XIX Congress of the C.P.S.U. (B). Towards an Improvement in the Standard of the Economic Work of Financial Institutions:* A. ZVEREV. *Reserves for the Reduction of Construction Costs:* K. FEDOSEEV. *Improve the Organisation of Income Tax Collection and the Direction of the Tax Inspectorate:* I. FADEEV. *Some Questions of the Execution of the 1952 State Budget in the U.S.S.R.:* N. VENIAMINOV and N. OBOLENSKY. *Control by the Rouble in Housing and Municipal Economy:* G. KUTUZOV. *Financial Control of the Use of Resources in Current Repair Work:* A. DODNOV. *The Finance of Supply and Sales Organisations:* T. VOROSHILOVA. *To Improve the Work of the Personnel of the Industrial Bank:* D. PUDIKOV. *Strengthen the Fight for Stricter Wage Controls:* T. CHERNYSHEVA.

No. 4, OCTOBER 1952. *For a New Victory of Communism! The Regime of Economy and the Tasks of Financial Institutions. Planning Money Circulation:* V. BATYREV. *Price Formation in the U.S.S.R.:* D. KONDARSHEV. *The Extension of Accounting—an Important Instrument of Financial Control for the Lowering of Construction Costs:* I. CHURNOSOV. *The Selection and Placing of Personnel in Finance Institutions and Banks:* M. MIKHAILOV. *The State Budget and Economic and Cultural Construction in the Kazakh S.S.R.:* T. TULEBAEV. *The Structure of Republican and Local Budgets:* N. SHIRKEVICH. *Correspondence Courses—an Important Way to Improve Finance Workers' Education:* A. SHAROV. *Credit Finance of Retail Trade:* YA. SAYDAKOVSKY. *Against the Accepted Form of Accounts with Budget Institutions:* I. FRIZMAN. *Financial Control in the Soviet Economy:* N. ROVINSKY. *The All-Union Higher School of Finance—a New Financial College of the Soviet Union:* A. KHUDOBIN.

No. 5, NOVEMBER 1952. *Comrade Stalin's Speech at the XIX Party Congress. The Historic Decisions of the XIX Party Congress. A Great Contribution to Marxist-Leninist Theory:* YA. KRONROD. *Thirty Five Years of Soviet Finance and Credit:* B. RIVKIN. *How to Strengthen Bank Control by the Rouble:* V. GERASHCHENKO. *Control by the Industrial Bank of Building Costs:* I. SUPRUNENKO. *Control over the Expenditure of State Funds:* S. TARUNYAN. *An Important Source of Deposits in the Savings Bank:* N. SUKHANOV. *Strengthen Control of Retail Trade Plan Fulfilment:* I. IOSIS. *The Simplification of Credit Operations for Retail Trade:* P. CHERNYSHEV. *A Return to the Old in the Guise of Innovation:* V. MASLYAEV.

Probleme Economice (Rumanian Text)

VOL. V, No. 8, AUGUST 1952. *The Popular Democratic State—an Instrument for Building a New Life:* GH. GHEORGHIU-DEJ. *23 August—the Day of our National Liberation. The Fifth Anniversary of the Rumanian Translation of "Das Kapital":* I. MUNTEANU. *The "Lenin" Volga–Don Canal, a Great Victory in the Building of Communism:* GH. HOSSU. *The Development and Further Advance of the Soviet Coal Industry:* I. BATI and M. PÂRJOL. *The Struggle to Accelerate the Velocity of Turnover of Circulating Capital in Timişoara Enterprises:* C. BÂRBULESCU. *The Decline of Agriculture in Capitalist Countries:* P. ROŞU. *The Assortment and Quality of Products is the Principal Task of the State Plan:* B. MIROSHNICHENKO. *The Rôle of Technical-Economic Indices in the Improvement of Equipment Use and the Utilisation of Productive Area:* L. MARCOVICI.

VOL. V, No. 9, SEPTEMBER 1952. *Economic Problems of Socialism in the U.S.S.R.:* J. STALIN. *Report of Gh. Gheorghiu-Dej on the R.P.R. Draft Constitution. The Constitution of the R.P.R. The Constitution for Building Socialism, a Constitution of Great Economic Progress. The*

Work of J. V. Stalin Concerning Right Deviationism in the C.P.S.U. (B): H. MIHAIL. *The Stalin Five Year Plan for the Development of the U.S.S.R. 1951–55*: P. TUDOR. *Raising the Technical Level of Workers*: V. DICU. *Successes of Socialist Industrialisation in the European Popular Democracies*: B. STOIAN. *The Schuman Plan, an Instrument of the American Monopolists for the Preparation of a New War*: P. MACOVEANU. *The Planning of Socialist Transport*: A. GALITSKY.

VOL. V, NO. 10, OCTOBER 1952. *The XIX Party Congress: Comrade Stalin's Speech, Comrade Malenkov's Report, Comrade Saburov's Report and Comrade Gheorgiu-Dej's Summary. 25 Years since the Publication of Stalin's "International Character of the October Revolution"*: L. TISMĂNEANU. *The Uninterrupted Progress of Technology in the U.S.S.R.*: G. ALEXANDRU. *Two Years' Successes towards the Accomplishment of the Great Electrification Plan in our Country*: D. SIMULESCU.

VOL. V, NO. 11, NOVEMBER 1952. *The 35th Anniversary of the October Revolution: Report by Comrade Pervukhin in Moscow; Speech by Comrade Constantinescu in Bucharest. Decrees: On Urban Reconstruction; On Bucharest Town Planning; On the Building of an Underground Railway in Bucharest. The Law of Planned, Proportionate Economic Development in the U.S.S.R.*: E. LOKSHIN. *Successes of Socialist Industry in Rumania*: M. FLORESCU. *The Natural Resources of China in the Service of Peace and Socialism*: V. NEGRESCU. *The Struggle of the Indian People for Independence*: L. STROJA. *An Intensification of Production in State Agriculture*: V. TOPOR.

Finansy i Kredit (Bulgarian Text)

NO. 9, OCTOBER 1952. *The Rôle and Functions of the Budget in Socialist Construction*: G. BOKOV. *The Rôle of the Budget Inspectorate in Formulating and Executing Local Budgets*: A. DIMITROV. *The World Production and Distribution of Gold and American Imperialist Policy*: I. KATINCHAROV. *The Finance of the Bulgarian Investment Bank in the Construction and Completion of Economic Capacity*: Ts. TSANEV. *The Significance of the Indivisible Funds of Collective Farms*: D. S.

Gospodarka Planowa (Polish Text)

NO. 7, 1952. *Eight Years of Liberated Poland. The Verification of Statistics and Reporting*: A. SZYPIŃSKI. *The Palace of Culture and Science in Warsaw*: H. JANCZEWSKI. *On the Proper and Timely Formulation of the Plan in Light and Co-operative Industry*: W. STACEWICZ. *Current Problems in the Mechanisation of Agriculture*: J. DMITREWSKI. *The Organisation of Investment Supervision Units*: A. HOROSZKIEWICZ. *On the Fuller Use of Soviet Experience in the Sphere of the Functions of Control in Our Co-operative Work*: A. FONAR.

NO. 8, 1952. *Questions of Construction in Connection with the VII Plenum of the Polish Communist Party*: S. JĘDRYCHOWSKI. *Fulfilment of the Plan for Lowering Production Costs in Industry*: Z. AUGUSTOWSKI. *The Kraków Voivod in Perspective Against the Six Year Plan*: K. KISIELEWSKI. *The Compatability of Two State Systems*: M. RAKOWSKI. *The Uneven Development of the United States*: J. MALINOWSKI. *The Mercantile Marine in the Light of Politico-Economic Changes*: I. TARSKI.

NO. 9, 1952. *The New Soviet Five Year Plan. Some Disproportions in Livestock Production and the Possibilities for Removing Them*: M. CZAJA. *The Regular Progress of Production*: S. GERSON. *Against an Unjust Levelling of Wages*: A. FERSKI. *The Rôle of Co-operatives in Supplies and Procurement*: J. MARECKI. *Steel in the Economies of Capitalist Countries*: J. MASTALERZ.

NO. 10, 1952. *The Electoral System*: M. MUSZKAT. *The Essentials of the Disproportion between Industry and Agriculture*: B. GATEŚKI. *Collective Methods of Planning*: N. KRONIK. *Methods of Graphical Distribution of Functions*: M. DOROSZEWICH and M. WAŻEK. *Production Planning in Machine and Tool Repair Workshops*: W. REMER. *Tasks of Clients and Carriers in the Liquidation of Peaks in Transport*: H.

TOMICZEK. *Remarks on Current Planning in Goods Turnover :* F. WILIŃSKI. *The Development of the Bulgarian People's Republic :* J. GAIK. *The Progress of Militarisation of the West European Economies :* J. MALINOWSKI.

No. 11, 1952. *Economic Problems of Socialism in the U.S.S.R. :* J. STALIN. *Before the XIX Congress of the Great Party of Lenin and Stalin. A Preliminary Analysis on the First Three Years of the Six-year Plan :* K. SECOMSKI. *Electricity in the Autumn–Winter Peak :* B. JASZCZUK. *Problems in the Planning and Fulfilment of the National Economic Supply Plan :* H. WITKOWSKI. *Questions of Planning Manpower Recruitment in the Light of the Directives of the VII Plenum of the Polish Communist Party :* W. DASZKIEWICZ. *Repair Problems in the Economy :* H. MARIAŃSKI and J. DMITREWSKI. *Soviet Aid : A Deciding Factor in the Development of the People's Democracies :* J. MASTALERZ.

NEW BOOKS

British

ANSTEY (V.). The Economic Development of India, 4th Edition. London : Longmans, 1952. 9″. Pp. vii + 677. 40*s*.

[This fourth, revised and enlarged, edition brings the record of Indian development down to the beginning of the Second World War. While various changes have been made in earlier Chapters, to bring them up to date, the chief revision takes the form of a complete rewriting of Chapter XVIII, which deals with the economic developments of the years 1929–39. This period, Mrs. Anstey emphasises, has a two-fold importance, first as a trade cycle involving severe depression and subsequent revival from it, and second as a period of great political and constitutional change with important economic and social repercussions. The prices both of jute and of cotton fell to less than a half of their pre-depression levels, and in addition the volume of exports at constant prices fell by at least a quarter (revaluations at different prices yield markedly different results). Largely as a consequence, the pressures for protective measures were greatly strengthened. Mrs. Anstey discusses fully both the policies themselves and their effects in promoting certain home industries, of which sugar, cotton manufactures, cement are the most significant. In the absence of a Census of Production, accurate measure of Indian progress is difficult to assess, and the slow development of agriculture means in any case that in total output rose slowly, and was probably outstripped by population growth. When she looks to the future, Mrs. Anstey stresses the weaknesses of the Indian economy as it was in 1939—the lack of capital, the scarcity of skilled managers and technicians, and lack of enthusiasm for reform. She sees in the recent political changes real ground for hope that development will proceed at an enhanced pace.]

ARTHUR (J.). Through Movement to Life. The Economic Employment of the Disabled. London : Chapman and Hall, 1952. 8½″. Pp. 93. 7*s*. 6*d*.

[This short book describes some of the lessons learnt in the operation of the Michael Works, of which the author was the founder. The labour force of this woodworking factory consisted almost entirely of severely disabled men, and it operated without any government or charitable subvention. Unfortunately the lack of a steady flow of suitable work combined with initial under-capitalisation forced the company into voluntary liquidation in 1949, when it was taken over by the Remploy organisation. In the meanwhile, however, much of value had been learnt, and Mr. Arthur has some interesting things to say both about the type of work most suitable for disabled men and about the personal problems involved in their employment. In his view the greatest service that could be rendered to the rehabilitation of severely disabled workers would be legislation to require public bodies such as hospitals to give priority in the award of contracts to disabled workshops, which are capable of executing such contracts at economic prices provided that a steady flow of work is assured.]

Banking and Foreign Trade. A Series of Lectures delivered at the Fifth International Banking Summer School, Christ Church, Oxford, July 1952. London: Europa Publications (for the Institute of Bankers), 1952. 8½″. Pp. 256. 15*s*.

[To be reviewed.]

The Bill on London. The Finance of Trade by Bills of Exchange. London: Chapman and Hall, for Gillett Brothers Discount Co., Ltd., 1952. 9½″. Pp. 94. 15*s*.

[This book, issued by a well-known London Discount House, is designed to provide general guidance on the purposes for which bills of exchange may be used and the ways of using them, particularly for the benefit of firms unaccustomed to drawing bills and unaware of their convenience.]

Blacker (C. P.) (Ed.). Problem Families: Five Inquiries. London: The Eugenics Society, 1952. 8½″. Pp. 123. 5*s*.

[The inquiries here described were sponsored and co-ordinated by the Problem Families Committee of the Eugenics Society and carried out in the five districts concerned by the staffs of the local Medical Officers of Health, the field work being mostly done by health visitors. Most of the report is taken up with summary tables based on the particulars collected by the field workers, together with commentaries. The results are in many respects disappointingly inconclusive. This is partly because of the unreliability of the information obtained and the large element of subjectivity involved in the field workers' assessments, and partly because of the lack of comparable particulars relating to normal families, in the absence of which several of the tables relating to problem families are difficult to interpret. Through many of the case histories included, moreover, there runs a tone of moral condemnation which, while very understandable, does not perhaps represent the most useful approach to the subject. However, some interesting findings do emerge; for example, that, in the families studied, mental subnormality was commoner among women than among men, whereas temperamental instability of various sorts was apparently more frequently observed in men than in women.]

British Electrical Development Association. Lighting in Industry. Electricity and Productivity Series, No. 2. London: British Electrical Development Association, 1952. 9″. Pp. xi + 153. 9*s*.

[This book provides useful information on the means of calculating the cost and efficiency of alternative lighting installations and surveys in some detail the types of lighting most suitable for particular industrial processes.]

British Travel and Holidays Association. Holidays in 1951. London: B.T.H.A., 1952. 8½″. Pp. 32. 2*s*. 6*d*.

[The results of the sample survey reported in this pamphlet contain much of interest to the economist and to the student of social habits, as well as to those engaged in the holiday industry. The proportion of the population taking a holiday away from home remained stable at just over 50% between 1949 and 1951 (the figure for 1950 being fractionally higher), and the same stability was for the most part to be found in the distribution of holiday makers between different parts of Great Britain. There was, however, a perceptible increase in the proportion of those going abroad for their holidays, and this was partly responsible for the increase in estimated annual national expenditure on holidays from £300 million in 1949 to £380 million in 1951.]

Brookes (B. C.). Notes on the Teaching of Statistics in Schools. London: Heinemann, 1952. 7½″. Pp. 80. 5*s*.

[These notes are designed to give practical guidance to those engaged in teaching statistics in secondary schools. Section I contains a fairly detailed survey of material that might be included in a general curriculum, and Section II contains teaching notes on the statistics syllabuses prescribed by G.C.E. examining authorities. The author's style is clear and helpful, and many of the suggestions he

makes should be of value in stimulating among schoolchildren an interest in statistical methods and an appreciation of how statistical material should be handled. Study of these notes is likely to convince many readers that statistics is a much more suitable subject for teaching in schools than economics.]

Cumberland House Journals and Inland Journals, 1775–1782. Edited by E. E. Rich. Second Series, 1779–82. London: Hudson's Bay Record Society, 1952. 9½". Pp. xiii + 313.

[This is the second of two volumes containing the journals kept at posts on the Saskatchewan in the earliest years of the Hudson's Bay Company's inland expansion from York Fort. Professor Glover devotes his long and interesting introduction to three main themes: the personality of Humphrey Marten, the chief factor at York Fort; the character of the men from the Orkneys on whom the Company principally relied for its labour force; and the small-pox epidemic which ravaged the Indian population in 1781–82 and gravely damaged the Company's interests in those years.]

The Durban Housing Survey. A Study of Housing in a Multi-racial Urban Community, by the Research Section of the Department of Economics and certain specialists in other Departments, University of Natal. Pietermaritzburg: University of Natal Press, 1952. 9". Pp. iii + 508. 35*s*.

[This is one of a series of supplementary reports, adding detailed information on particular topics to the more general Regional Survey of Natal which the Natal University College has been conducting for the Natal Social and Economic Planning Council. The report is in part descriptive and qualitative; in part it draws on earlier and existing statistical material; in part it presents the results of a one-in-twenty random sample survey made in 1943/4. It covers European, Indian and African housing alike, and in the last case the whole gamut from the European-type houses of the Africans of the professional class to the horrifying shacks in which so many live. The report inevitably emphasises the almost insoluble difficulties of making proper provision for housing an urban community of the very poor at anything like an economic rent.]

Eaton (J.). Economics of Peace and War. London: Lawrence & Wishart, 1952. 7½". Pp. 110. 8*s*. 6*d*.

[An analysis of Britain's economic problems in orthodox Stalinist Marxist terms. The author is notably well informed, and his vituperative pages contain some well-argued points. His general approach and conclusions do not contain any surprises.]

Federation of British Industries. Royal Commission on the Taxation of Profits and Income 1952. London: Federation of British Industries, 1952. 8½". Pp. 59. 1*s*. 4*d*.

[This memorandum contains brief discussion of and proposals on a variety of topics not dealt with in the documents previously submitted by the Federation to the Millard Tucker Committee and to the Royal Commission on Taxation.]

Ferguson (T.). The Young Delinquent in his Social Setting. London: Oxford University Press, for the Nuffield Foundation, 1952. 9". Pp. iii + 158. 10*s*. 6*d*.

[To be reviewed.]

Fraser-Stephen (E.). Two Centuries in the London Coal Trade. The Story of Charringtons. London: Charringtons, 1952. 10". Pp. 157.

[This beautifully produced volume traces the history of the firm which, as a result of a series of amalgamations, has now become the largest retail coal distributor in the country. For the general reader the chapters dealing with the earlier history of the firm contain more of interest than those concerned with more recent times.]

HARGREAVES (E. L.) and GOWING (M. M.). Civil Industry and Trade. History of the Second World War. London: H.M. Stationery Office and Longmans, 1952. 9½". Pp. v + 678. 37*s*. 6*d*.

[To be reviewed.]

HARROD (R. F.). Economic Essays. London: Macmillan, 1952. 8½". Pp. v + 301. 18*s*.

[To be reviewed.]

HAWTREY (R. G.). Capital and Employment. 2nd Edition. London: Longmans, 1952. 9". Pp. v + 337. 40*s*.

[The first edition of *Capital and Employment* was reviewed by H. Townshend in the ECONOMIC JOURNAL of June 1937. In this revision, Professor Hawtrey has made a number of alterations and additions, especially in the chapter dealing with Keynes's *General Theory*, which is now largely rewritten. Of particular interest is the passage in which Professor Hawtrey combats the view that the Oxford inquiry of 1939 showed that bank-rate movements have no important effect on dealers' stock holdings. A new chapter is added containing an extended review, which originally appeared in Italian in the *Rivista di Politica Economica*, of the Experts' Report to the United Nations of December 1949 on *Measures for Full Employment*.]

HOULDSWORTH (SIR HUBERT), JONES (H.), LATHAM (LORD) and CITRINE (LORD). Efficiency in the Nationalised Industries. London: Allen & Unwin, 1952. 8½". Pp. 65. 7*s*. 6*d*.

[Four papers dealing respectively with the National Coal Board, The Gas Industry, London Transport and Electricity Supply.]

INTERNATIONAL ECONOMIC ASSOCIATION. International Economic Papers No. 2. Edited by A. T. Peacock, R. Turvey, F. A. Lutz and Elizabeth Henderson. London: Macmillan (New York: The Macmillan Co.), 1952. 10". Pp. 232. 15*s*.

[To be reviewed.]

ISARD (W.) and WHITNEY (V.). Atomic Power. An Economic and Social Analysis. London: Allen & Unwin, 1952. 9". Pp. vii + 235. 37*s*. 6*d*.

[To be reviewed.]

MCMAHON (C. W.). The British Purchase Tax. Fabian Research Series, No. 154. London: Fabian Publications, 1952. 8½". Pp. 28. 1*s*.

[This pamphlet does not contain any particularly novel ideas, but it provides a useful succinct summary of the history of the purchase tax and of current arguments about its advantages and disadvantages.]

MAY (S.), FAALAND (J.), KOCH (A. R.), PARSONS (H. L.) and SENIOR (C.). Costa Rica. A Study in Economic Development. London: Allen & Unwin (New York: The Twentieth Century Fund), 1952. 8½". Pp. v + 374. 24*s*.

[To be reviewed.]

Measurement of Productivity—Work Study Application and Training. Issued by the Joint Committee of the Institute of Cost and Works Accountants, and the Institution of Production Engineers. London: Gee & Co., 1952. 9". Pp. 62. 5*s*.

[After arguing the importance of work study, including method study, motion study and work measurement, this pamphlet is chiefly devoted to the selection and training of the various grades of practitioners needed for its application.]

MEYER (F. V.). Great Britain, the Sterling Area and Europe. Cambridge: Bowes & Bowes, 1952. 8½″. Pp. vii + 150. 21*s*.

[To be reviewed.]

NUFFIELD PROVINCIAL HOSPITALS TRUST. Report of an Experiment in Hospital Costing. Oxford: Oxford University Press, 1952. 8½″. Pp. 235. 5*s*.

[This inquiry into hospital costing methods was undertaken at the invitation of the Minister of Health. As the result of an experimental system put into practice over a period of a year in the group of hospitals co-operating in the inquiry, the conclusion is reached that a system of departmental costing would not be unduly expensive to introduce, and might with advantage replace the analysis of cost under subjective headings currently required from hospitals by the Ministry of Health.]

ORDISH (G.). Untaken Harvest. London: Constable, 1952. 9″. Pp. vii + 171. 15*s*.

[This book tries to measure the losses in agriculture due to pests and diseases and the possibilities of reducing them. For the United Kingdom, which is not one of the worst sufferers, despite control measures which are estimated to cost nearly £10 million there are estimated losses from these causes of close to £80 million. It need hardly be emphasised what a considerable contribution to import saving can be made by more effective measures of pest and disease control.]

PETRIE (J. RICHARDS). The Taxation of Corporate Income in Canada. Toronto: Toronto University Press (London: Geoffrey Cumberlege), 1952. 9½″. Pp. ix + 380. 55*s*.

[A comprehensive analysis of a tax which in recent times has yielded over a quarter of Canada's national revenue.]

POSTAN (M. M.) and RICH (E. E.) (Ed.). The Cambridge Economic History of Europe. Vol. II. Trade and Industry in the Middle Ages. London: Cambridge University Press, 1952. 9½″. Pp. v + 604. 45*s*.

[To be reviewed.]

POUNDS (N. J. G.). The Ruhr. London: Faber, 1952. 9″. Pp. 283. 25*s*.

[To be reviewed.]

Research and Development in British Industry. London: Federation of British Industries, 1952. 8½″. Pp. 19. 1*s*. 6*d*.

[This is based on the replies made by some 300 firms to a questionnaire circulated by the F.B.I. Industrial Research Committee. A comparison with the results of an earlier survey suggests an increase in expenditure on research and development between 1945/6 and 1950/1 of something over 50%, though the representativeness of the sample is admittedly too uncertain to permit any very firm conclusions to be drawn.]

REGISTRAR OF BANKS. Sixth Annual Report, Period ended 31st December, 1952. Pretoria: The Government Printer, 1952. 13″. Pp. 39. 4*s*.

ROSS (J. S.). The National Health Service in Great Britain. London: Oxford University Press, 1952. 9″. Pp. vii + 398. 30*s*.

[To be reviewed.]

ROWE (F. W.). The History of Education in Newfoundland. Toronto: The Ryerson Press, 1952. 9″. Pp. 147. $4.

[An interesting and competent history of the educational system in Newfoundland and of the origins of the unusual division of responsibility between government and religious denominations by which it is characterised.]

SAWER (G.) (Ed.). Federalism. An Australian Jubilee Study. Melbourne: F. W. Cheshire, for the Australian National University, 1952. 8½″. Pp. i + 284. 39*s*. 6*d*.

[This contains the proceedings of two Seminars on Federalism organised by the Australian National University in 1951. Among the contributions of interest to economists are "Principles of Decentralisation," by Colin Clark, "Some Aspects of Federal-State Financial Relations (Australia)," by H. P. Brown and "Federal Finance (Canada)," by W. A. Mackintosh. Each paper is followed by discussion.]

SAYERS (R. S.) (Ed.). Banking in the British Commonwealth. Oxford: Oxford University Press, 1952. 9″. Pp. vii + 486. 35*s*.

[To be reviewed.]

SCHLOTE (W.). British Overseas Trade from 1700 to the 1930's. (Translated by W. H. Chaloner and W. O. Henderson). Oxford: Basil Blackwell, 1952. 9″. Pp. iii + 181. 22*s*. 6*d*.

[To be reviewed.]

SHOVE (FREDEGOND). Fredegond and Gerald Shove. Cambridge: Privately printed, 1952. Copies obtainable from Bowes & Bowes. 9½″. Pp. vi + 46. 8*s*. 6*d*.

[This privately printed and very intimate document may be of interest to a select few of Gerald Shove's former pupils and colleagues. It includes, besides other and more personal documents of her own, a brief picture of Gerald written by Fredegond shortly after his death. While it is in no way concerned with his notable contributions to economics, it may help others to glimpse some of the less visible facets of a very remarkable personality.]

STARK (W.). Jeremy Bentham's Economic Writings. Volume II. London: Allen & Unwin, 1952. 8½″. Pp. 458. 40*s*.

[To be reviewed.]

STEIN (G.). The World the Dollar Built. London: Dobson, 1952. 9″. Pp. 288. 12*s*. 6*d*.

[The charge that the post-war prosperity of the United States has been based on armaments expenditure is the most damaging line of attack that is currently brought against American capitalism by its detractors, and the one that is most difficult to refute. The central contention of Mr. Stein's highly controversial book is that the ever-present (and well-founded) fear of a return to depression, in conjunction with the strength of the organised opposition to stabilisation measures which would involve any reduction in the power or prestige of business leaders, has driven the United States into a state of dependence on armaments expenditure that can lead ultimately only to a third world war. Mr. Stein writes as a journalist rather than an economist; in stressing the pathology of American capitalism—he has much to say in passing on the shortcomings of the "free enterprise" system in such spheres as social security, housing, the distribution of income and the alleviation of rural poverty—he does not make sufficiently clear the magnitude of its achievements during and since the war. Nor does he enter into the crucial and highly complicated question whether, in the event of a large reduction in military spending, the accompanying reduction in taxation would cause consumption and private investment to rise sufficiently to fill the gap without at the same time leading to an early exhaustion of investment opportunities. However, despite these shortcomings and a general tendency to overstatement, the book is well informed as well as eloquently written, and on a popular plane it makes a good case. The reader is left in no doubt as to the sincerity of the author's desire to see reforms in the American economic and political system which would enable it to find an alternative to what he conceives to be its present disastrous choice between slump and war.]

WORSWICK (G. D. N.) and ADY (P. H.) (Ed.). The British Economy 1945–1950. Oxford: Oxford University Press, 1952. 8½″. Pp. 621. 35*s*.

[To be reviewed.]

Indian

BHARGAVA (R. N.). The Principle and Problems of Inheritance Taxation. Banaras: Nand Kishore, 1952. 9″. Pp. 195.

[The author, a member of the Department of Economics of the University of Allahabad, starts by discussing the whole theory and equity of inheritance and of the taxation of inheritance, judged both by its effects on work and saving and by the possible redistribution of capital and income. He invokes the practice and experience not only of India but also of the United Kingdom, of the United States and other countries. He examines in some detail the Rignano scheme, but decides on balance against measures to discriminate according to the age of the fortune. He then goes on to examine the present law of India, both in its constitutional aspects and from the point of view of equity and evasion where the joint family system rules. His final conclusion is that death duties should be a matter of central legislation and administration. He suggests an exemption limit of Rs. 100,000 (in contrast to £2000 in the United Kingdom) and a maximum rate of 20% over Rs. 5 million.]

DAS HAJELA (PRAYAG). Keynes's "General Theory," Trade Cycle and Foreign Exchange. Allahabad: Pothishala, Ltd., 1952. 9″. Pp. 3 + 232. Rs. 5*s*.

[This book is made up of four related essays. In the first the author outlines the main elements of Keynesian theory and discusses the validity of the claim that it embraces classical economics as a special case. The second essay is devoted to a discussion of the purchasing power parity theory of the foreign exchanges and its defects and with the alternative theories that may be advanced in its place. The third essay contains an account of the theories of the trade cycle advanced by Hawtrey, Hayek and Keynes and their implications for policy. The book is concluded by a brief paper on the definition of money.]

GOODALL (M. R.). Administration and Planning for Economic Development. Three Lectures. Delhi: Ranjit (Cambridge: Students' Bookshops), 1952. 7″. Pp. 61. 3*s*. 6*d*.

[The principal subjects discussed in these lectures relate to co-operation between government economic planning agencies and private individuals and interest groups, and to the relationship between different branches and levels of administration within the government itself.]

Indian Annual Market Review, 1951. Bombay: Premchand Roychand, 1952. 10″. Pp. 79.

LALWANI (KASTUR CHAND) (Ed.). Industrial Economics. Calcutta: Artha Vanijya Gabesana Mandir, 1952. 7½″. Pp. 255.

[This is the fifth volume in a series of Handbooks on Economics and Commerce. This volume in fact deals with the broadest issues of Indian economic policy, including commercial policy, fiscal policy, the place of foreign capital and the like, as well as the more straightforward problems of industrial organisation, management and location. It is descriptive of what is and what might be rather than analytical. It is seldom concerned with first principles. But these can more readily be derived from other books, and this book will prove a useful source of information for elementary students in India.]

MISRA (B. R.). Economic Aspects of the Indian Constitution. Calcutta: Oriental Longmans, 1952. 8½″. Pp. 84. Rs. 4*s*.

[Prof. Misra, of the University of Patna, stresses the intimate relations between the Union and the States which must exist and work smoothly if the necessary economic policies are to be successfully carried out.]

RAMASWAMY (T. N.). Economic Analysis of the Draft Plan. Allahabad: The Indian Press, 1952. 8″. Pp. vii + 159. Rs. 5*s*.

[This is a very puzzling book. It is quite clear that Mr. Ramaswamy dislikes something very strongly. But it is very difficult to find out what it is that he dislikes. He clearly believes that the present Indian Draft Plan is a bad plan. He distrusts its population assumptions; he distrusts its price policies and the assumed possibilities of controlling prices; he distrusts the heavy emphasis on river projects; he distrusts the inadequacies of the agricultural policies. Above all, he holds that "to pretend that our country, at the present stage of its development, is fit to conceive and implement a democratic plan is to shut one's eyes to the fundamental deficiencies of the intellectual and cultural background of the majority of populations in our country." Having read thus far, one may be forgiven for expecting a final chapter on the virtues of *laisser-faire*. Instead, we are told that "those who attempt to plan for our country will . . . have to build like giants and work like jewellers." The existing planners have been, it would seem, as heavy footed as giants. But where are these giant-jewellers to be found?]

American

AIZSILNIEKS (A. P.). Co-operation behind the Iron Curtain. Madison: Mimir, 1952. 9″. Pp. i + 49. $1.

[The author of this study of consumer co-operation in the U.S.S.R. is a Latvian economist now resident in Sweden. His main concern is not so much to investigate the part played by co-operation in the Soviet economy, though he provides a certain amount of information bearing on this, as to demonstrate the small degree of autonomy enjoyed by Russian consumer co-operatives and to emphasise their essentially political character.]

ANDERSON (W. H.). Taxation and the American Economy. An Economic, Legal and Administrative Analysis. New York: Prentice Hall, 1952. 9½″. Pp. xix + 598.

[This text-book deals comprehensively with the various types of federal, state and local tax in force in the United States.]

ANTHONY (R. N.). Management Controls in Industrial Research Organisations. Boston: Harvard Graduate School of Business Administration (London: Bailey Bros. & Swinfen), 1952. 8½″. Pp. v + 537. 54*s*.

[This study is based on an extensive collection of first-hand material, derived from detailed study of a certain number of industrial research establishments and from answers to a questionnaire circulated to a much larger number. The author is concerned with such questions as the means by which corporations make funds available to their research organisations, the planning of research programmes and the control over work in progress and the expenditure it involves. Though couched in fairly general terms, the book is addressed primarily to readers practically concerned in business administration rather than to economists.]

Approaches to Problems of High Fertility in Agrarian Societies. Papers presented at the 1951 Annual Conference of the Milbank Memorial Fund. New York: Milbank Memorial Fund, 1952. 9″. Pp. 171.

[Most of the contributions to this symposium deal with population problems of individual countries, among them Korea, India, Japan, Mexico and Puerto Rico. Among the more general papers, that by Dr. Clair E. Folsome is notable for its categorical conclusion that medical science has yet to produce a method of fertility control suitable for use in poor agrarian societies.]

BIRD (F. L.). The Municipal Debt. A Description, Analysis and Appraisal of Debt Policy and Administration of the City of New York. New York: Mayor's Committee on Management Survey, 1951. 8½". Pp. v + 148.

[The background of this study is the very large volume of New York City bonds outstanding, much of it is the result of short-sighted borrowing in the past, and the anomalously low credit standing of the New York City bonds in the market.]

BRESSLER (R. G.). City Milk Distribution. Cambridge, Mass.: Harvard University Press (London: Geoffrey Cumberlege), 1952. 8½". Pp. vii + 398. 40*s*.

[This study from the Department of Agricultural Economics at the University of Connecticut begins with an analysis of the present organisation of milk distribution, as illustrated by typical major, secondary and dispersed rural markets. It goes on to discuss the chief components of cost of distribution under the heads of delivery trucks, labour, bottling plants and the like and examines the possibilities of securing economies by reorganisation and by possible rationalising through exclusive territories or complete municipal operation. Finally, it goes on to the analysis of consumer demand, and studies of consumer reaction to various cost-saving forms of reorganisation. The author ends by expressing his conviction that very substantial savings are practicable.]

BUCK (A. E.). Budgeting and Financial Management of the City of New York. New York: Mayor's Committee on Management Survey, 1952. 8½". Pp. v + 90.

[This monograph deals with the processes by which the budget of New York City is prepared and receives legislative authorisation, and with the system by which the City's expenditure is managed and controlled. The author finds grave fault in each of these branches of administration, and he suggests some thoroughgoing reforms.]

COLE (A. H.) and WATTS (G. B.). The Handicrafts of France, as recorded in the Descriptions des Arts et Métiers 1761–1788. Boston: Baker Library, Harvard Graduate School of Business Administration, 1952. 11". Pp. 43.

[The *Descriptions des Arts et Métiers*, published by the Académie Royale des Sciences of Paris in 1761–88, have been relatively little used by historians, and few libraries contain a complete collection of the many volumes by different authors that go to make up the series. The technical descriptions they contain may be taken, as Professors Cole and Watts put it, to "portray the maxima of skills attained at the end of a social period, the age of the handicraftsman." The present pamphlet describes the origins and character of the series, together with biographical particulars on its authors and editors, and furnishes in addition extensive bibliographical information about it.]

COLTON (J.). Compulsory Labor Arbitration in France, 1936–1939. New York: Columbia University Press (London: Geoffrey Cumberlege), 1951. 8". Pp. xvi + 220. 21*s*.

[This book traces the origins, growth and development of the system of compulsory arbitration which operated in France from 1937 until the outbreak of war in 1939. The great wave of sit-down strikes in the spring of 1936 was a strange manifestation by the workers with which to welcome the Popular Front Government. The efforts of the Government to handle that embarrassing situation, at first by conciliation and mediation and varying degrees of Government pressure, led on inevitably to compulsory arbitration. It was compulsory arbitration in a peculiar sense in that, at first, it imposed no penalties for its disregard, and the penalties later introduced were half-heartedly applied. The most interesting topic discussed is the attempt to limit the absolute discretion of the arbitrators. The legislation, in requiring them to adjust to the variation in the cost of living "*les salaires dont cette variation rend la modification nécessaire*," can hardly be said to have provided clearer guidance than the one such

attempt in modern British statutory wages regulation contained in the Agricultural Wages (Regulation) Act of 1924. Nevertheless, the *Cour Supérieure d'Arbitrage* evolved out of that cryptic formula a code of practice which, incidentally, contributed largely to labour's disillusionment with the whole system of compulsory arbitration. The author's conclusion is that the system contributed to industrial peace in France. But it is clear—as he admits—that there were other and more potent factors operating towards the end of the experiment to account for M. Charles Pomaret's statement as French Minister of Labour to the International Labour Conference in 1939 : " *Il n'y a pas une seule grève sur l'ensemble du territoire français.*"]

Conference on Research in Business Finance. New York : National Bureau of Economic Research, 1952. 9½". Pp. vii + 340. $5.

[To be reviewed.]

COOLSEN (F. G.), MYRES (W. S.) and MARTIN (J. W.). Paducah and Western Kentucky Income, Labor and Retail Trade Patterns. Frankfort, Kentucky : Agricultural and Industrial Development Board of Kentucky, 1952. 11". Pp. ii + 68.

[A study of income and labour market conditions in an area in western Kentucky in which extensive construction of atomic energy and related plants has recently taken place.]

DIEBOLD (W.). The End of the I.T.O. Essays in International Finance, No. 16. Princeton : Princeton University Press, 1952. 9". Pp. 37.

[The author of this interesting essay reviews the political and economic pressures that led to the ITO Charter being dropped by the United States administration. He discusses the two to some extent conflicting lines of thought that caused the Charter to be unpopular in American business circles, namely the old-fashioned protectionist viewpoint on the one hand and on the other the newer approach, which he terms " perfectionist," which found the Charter unsatisfactory as containing too many escape clauses which might be invoked to the disadvantage of the United States and as making too many concessions generally to the principle of government intervention in economic affairs. He then goes on to consider the strains to which GATT, " the ITO *manqué*," has been subjected, and to discuss the difficulties of applying the underlying doctrines of the ITO in a world largely different from that on which it was premised.]

EGLE (W. P.). Economic Stabilization. Objectives, Rules, and Mechanisms. Princeton : Princeton University Press for the University of Cincinnati (London : Geoffrey Cumberlege), 1952. 9". Pp. v + 264. 25*s*.

[The central thesis of this book is its advocacy of what the author calls " the method of binding targets " as a way of avoiding or mitigating cyclical fluctuations. This method is closely similar to that sometimes known as " full employment by magic." The idea is that the government guarantees the maintenance of the national income (or whatever other measure of activity may be chosen) at a certain level, or within certain limits, and is prepared to engage in deficit finance or any other procedure necessary to attain the desired end. However, the stabilisation of entrepreneurial expectations engendered by the guarantee will, it is hoped, by itself bring about the desired stability in activity without the government actually having to do anything. The author argues that this is the most promising means of achieving stability without damage to the freedom of enterprise.]

GAMBS (J. S.). Man, Money, and Goods. New York: Columbia University Press (London : Geoffrey Cumberlege), 1952. 8½". Pp. vii + 339. 24*s*.

[To be reviewed.]

HAIG (R. M.) and SHOUP (C. S.). The Financial Problem of the City of New York. New York: Mayor's Committee on Management Survey, 1952. 8½". Pp. 551.

[This is the summary volume of the Finance Project of the Mayor's Committee on Management Survey of the City of New York. It is based in part on monographs already separately published. Critical discussion of the pattern of the City's expenditure fell outside the terms of reference of the Project, and the volume is mainly taken up with analysis of the various current sources of revenue and the ways in which they might be altered or added to.]

LEWIS (B. W.). British Planning and Nationalisation. New York: The Twentieth Century Fund (London: Allen & Unwin), 1952. 9". Pp. v + 313. 24*s*.

[To be reviewed.]

MARTIN (J. W.). Paducah and McCracken County Revenue Base. Frankfort, Kentucky: Agricultural and Industrial Development Board of Kentucky, 1952. 11". Pp. 9.

[An analysis of the level of assessments in the county and of the equity of the tax system resulting from them.]

MILLS (F. C.). Productivity and Economic Progress. New York: National Bureau of Economic Research, 1952. 9". Pp. 36. 75c.

[This essay sets forth the results of three fundamentally simple but none the less extremely instructive calculations relating to the growth of output in the United States during the last sixty years. First, the elements in increases in gross national product in each decade attributable respectively to productivity gain and change in labour input are distinguished; secondly, measures are given of the proportion of each decade's real output necessary for the maintenance of the capital stock and for the maintenance of per head consumption at the standard of the preceding decade; and finally, the "margin above maintenance needs," which is the residual in the second calculation, is divided into the three uses to which it was put, military expenditure, net capital formation and consumption change. The statistical basis of these calculations will be more fully described in a forthcoming National Bureau monograph.]

MISES (L. VON). Planning for Freedom, and other essays and addresses. South Holland, Illinois: Libertarian Press, 1952. 8". Pp. 174. $1·50.

[This is a collection of essays and addresses previously published in various newspapers and journals. Professor Mises sets forth his well-known extreme *laissez-faire* position, to which Keynes and Veblen are no less anathema than Marx. Unfortunately in the brief space of each paper Professor Mises is not able to get down to any very close or profound reasoning, and the tone is polemical rather than analytic.]

MORGAN (T.). Introduction to Economics. New York: Prentice Hall, 1952. 9½". Pp. vii + 857.

[To be reviewed.]

PATTERSON (G.) and BEHRMAN (J. N.). Survey of United States International Finance 1950. Princeton: Princeton University Press, 1952. 9". Pp. iii + 310. 15*s*.

[This survey, from the International Finance Section of Princeton University, carries on from an earlier experimental survey covering 1949. It is best described as a critical record. It aims to give the full story of the year within its chosen field, but from time to time, and particularly in short introductory or concluding paragraphs, some shrewd comment emerges. This year's volume is divided into seven main sections: grant programmes; the Point Four programme; loans and investments; the Bank and the Fund; commercial policy; European economic integration; the United States balance of payments. On the whole the work is very well done, though there are naturally points on which a reader may

find himself in disagreement. Why, for instance, should they assume (p. 268) that the disappearance of East–West trade is to be expected to raise the relative importance of intra-European trade with other countries rather than extra-European trade? Were not the Danubian imports largely of a kind, such as grain, which must now be imported from outside? This is a useful addition to the already large class of such surveys. Its special interest is that it has a particularly American viewpoint.]

PHELPS (C. W.). The Role of the Sales Finance Companies in the American Economy. Studies in Consumer Credit, No. 1. Baltimore: Commercial Credit Co., 1952. 9½″. Pp. iii + 87.

[This account of the evolution of sales finance companies and their relation to the automobile industry was commissioned and is published by one of the three largest firms engaged in this type of business in the United States. Professor Phelps's somewhat uncritical treatment of the subject essentially as a big success story reflects the circumstances in which the work originated. It contains, however, a certain amount of useful and interesting information.]

QUINTO (L. J.). Municipal Income Taxation in the United States. New York: Mayor's Committee on Management Survey of the City of New York, 1952. 8½″. Pp. v + 116.

[A factual study of a type of local tax which has come increasingly into use in the United States in recent years, especially in the states of Pennsylvania and Ohio, and which seems likely to be adopted still more widely in the future. With the exception of the District of Columbia income tax, which stands on a rather different footing, all the systems studied are of a broadly similar character, the commonest practice being to impose a proportional 1% tax on all earned incomes, leaving unearned incomes and sometimes also corporate profits exempt.]

Re-Privatizing Public Enterprise. Washington: Chamber of Commerce of the United States, 1952. 9″. Pp. 38. 50c.

[The purpose of this pamphlet is to consider the means by which nationalised industries and firms may be restored to private ownership, and to demonstrate that the difficulties involved are not prohibitive. Especial attention is paid to the case of the Schering Corporation, which was returned to private ownership in March 1952 after being owned and operated by the United States government for ten years.]

STIGLER (G. J.). The Theory of Price. Revised Edition. New York: The Macmillan Co., 1952. 8½″. Pp. v + 310. 28*s*.

[The earlier editions of this book were reviewed by Professor E. A. G. Robinson in the ECONOMIC JOURNAL of March 1948. The present version has been completely rewritten, and the emphasis is shifted to a fuller treatment of the relationship between the theory and the empirical evidence. This is achieved without losing the theoretical rigour which was so noteworthy a feature of the earlier editions and without sacrifice of brevity. The section on capital and interest, formerly the least successful part of the book, is now omitted. The result is an advanced text-book of an extremely satisfying character, and one that is in certain respects unique.]

STIGLER (G. J.) and BOULDING (K. E.) (Ed.). Readings in Price Theory. Chicago: Richard D. Irwin for the American Economic Association, 1952. 9″. Pp. v + 568.

[To be reviewed.]

TAYLOR (J.). Business and Government, an Introduction. College Outline Series, No. 82. New York: Barnes & Noble, 1952. 8½″. Pp. v + 322. $1·75.

[This introductory text-book deals with the various forms of government intervention in economic affairs, including anti-trust and social welfare legislation, the regulation of labour unions, the protection of agriculture, full-employment policy and a wide range of other topics. The style of the book is lively and to the point, and the general approach sensible and well balanced. It is, however, designed exclusively for the American reader.]

VICKREY (W. S.). The Revision of the Rapid Transit Fare Structure of the City of New York. New York: Mayor's Committee on Management Survey, 1952. 8½″. Pp. v + 156.

[The traditional flat fare charged on the New York subway is now found to bring in an inadequate revenue, and can no longer be said to favour a desirable pattern of city growth. The present very interesting monograph is devoted to a discussion of possible alternatives. It contains careful estimates of marginal costs of particular types of traffic and a brave attempt to make quantitative measures of the much less easily calculable part of the problem, the response of traffic to fare changes. In the author's opinion, discrimination by time of day is likely to contribute more to economic utilisation of the system than discrimination by mileage travelled, though both are desirable in principle. Some of his suggestions are extremely ingenious, and he deals fully with the cost and practicability of fare-collection under the different schemes considered.]

WALKER (C. R.) and GUEST (R. H.). The Man on the Assembly Line. Cambridge, Mass: Harvard University Press (London: Geoffrey Cumberlege), 1952. 8½″. Pp. 180. 21*s*.

[This small book sets out to examine the effects of mass production, or mass assembly, jobs on the individual worker. "A representative sample of 180 workers on an automobile assembly line were interviewed in their homes with a schedule designed to bring out facts, attitudes and opinions about their jobs, their relations to fellow workers and supervisors, working conditions, pay and promotion, and relations to the union." The report and its numerous illustrations provide a clear enough picture of the whole environment of work. Only eighty-two out of the 180 had previously been in manufacturing employment; textiles and shoes accounted for thirty-two of them, and only two had previous experience of automobile assembly. Median weekly wages on previous jobs were $42; in the assembly plant $60·4, both excluding overtime. Roughly 10% of the 180 preferred or were indifferent to jobs with mass-production characteristics. The great majority expressed varying degrees of dislike. The good working conditions of the plant were appreciated, but it was frequently held that they did not counterbalance the drudgery of the line. In terms of pay and security 147 liked the job, and only one stated a dislike. The contrast with previous jobs is marked in this respect; only fifty-four liked and eighty-one disliked their previous job from this point of view. But in terms of job content fifty-three liked their previous job and eighteen disliked it; only seven liked the present job and ninety-six admitted a dislike. The report discusses in some detail the reasons for this dislike, many of which can be summed up in the effective but unattractive word "de-personalisation."]

WELLS (H. A.). Monopoly and Social Control. Washington: Public Affairs Press, 1952. 9½″. Pp. v + 158. $3·25.

[To be reviewed.]

French

BÉNARD (J.). La Conception Marxiste du Capital. Paris: Société d'Édition d'Enseignement Supérieur, 1952. 8½″. Pp. 365.

[To be reviewed.]

CIPOLLA (C. K.). Mouvements Monétaires dans l'État de Milan, 1580–1700. Paris: Armand Colin, 1952. 10″. Pp. 93. 300 fr.

[This scholarly monograph describes the monetary system of the state of Milan in 1580–1700 and traces the relations between the quantities of different types of money, the level of prices and, in so far as it can be ascertained, the level of production. The author's tentative conclusions emphasise the importance of demographic and other non-monetary influences on the price level and the impropriety of taking monetary statistics as a criterion of the general state of economic prosperity in the period in question.]

GUGLIELMI (J.-L.). Naissance et Formation des Trade Unions des Mineurs en Grande Bretagne. Paris: Armand Colin, 1952. 10". Pp. 158.

[This study covers the period 1843–1919. The author has attempted to analyse the separate economic, social and other factors which, in combination, have contributed to the development of trade unionism among the British miners. On the economic side, he instances, in particular, the cyclical movement of wages with prices in an industry where labour costs constitute a high proportion of total cost. As to the other influences which have moulded the organisation of the mine-workers, M. Guglielmi touches on much that is interesting, *e.g.*, the social importance of the valley geography of South Wales. In the relatively short compass of his work, however, he is unable to develop the argument fully. The history of the miners in Britain and in other countries, as M. Guglielmi indicates, often reads like that of a race apart from other men. The transition from the conditions which inspired Zola to write "Germinal" to the position which the miner now holds is a remarkable commentary on the resilience and versatility of modern Society. It offers a fascinating field for continued study.]

MOSSÉ (R.). Les Salaires. Paris: Marcel Rivière, 1952. 8½". Pp. 324.

[To be reviewed.]

PIETTRE (A.). L'Économie Allemande Contemporaine (Allemagne Occidentale) 1945–1952. Paris: M.-Th. Genin, 1952. 10". Pp. 672.

[To be reviewed.]

Belgian

JACQUEMYNS (G.). Une Crise de Consommation. Brussels: Parc Léopold, 1952. 8½". Pp. 37.

[Twelve questions were put to Belgian consumers by the Institut Universitaire d'Information Sociale et Economique in order to discover how their expenditures were affected by anticipated price rises at the beginning of the war in Korea, and what accounts for the current decline in their expenditures. The information is intended, *inter alia*, to cast light on whether the latter is primarily due to expectations of falling prices, to lack of income at ruling prices or to a desire to hold a reserve of income against future developments. The questions were asked of different income, social, age and sex groups, and among the Walloon and Flemish populations. No details are given of the size of the sample.]

La Situation Economique de la Belgique et du Congo Belge, 1951-1952. Edited by the Kredietbank, S.A. Courtrai: Vermaut, 1952. 8½". Pp. 105.

[This useful little handbook, of which the Kredietbank has brought out several since the War, covers the period June 1950–September 1952. It thus includes the great fluctuations in prices of raw materials which were set in motion by the outbreak of the Korean War, and the effects of rearmament on economic activity. The book is amply documented with statistical tables dealing with production, foreign trade, etc., in Belgium and the Belgian Congo.]

German

BAADE (F.). Brot für ganz Europa. Hamburg: Paul Parey, 1952. 10". Pp. 230.

[To be reviewed.]

BIEHL (M.). Das Zahlungsbilanzproblem der Vereinigten Staaten und Deutschlands Dollar-Ausfuhr. Kiel: Institut für Weltwirtschaft an der Universität Kiel, 1951. 12″. Pp. 74 + appendices.

[A short and readable account of the dollar problem from the German point of view. After a competent survey of the U.S. balance of payments over the last fifteen years, the report gives a short account of the German export drive to the Western Hemisphere. Like Great Britain, the German economy has suffered a deterioration in the terms of trade. However, the structure of German exports to the United States is radically different from that existing before the war as compared with Britain. Thus the partition has meant the loss of exports of chemicals and machinery which formerly were important. Now the exports of finished goods, particularly textiles and china, is relatively more important, and these are precisely the goods which are likely to face very heavy competition and are most likely to be curtailed by tariffs.]

BINDER (P.). Die Geldkapitalbildung. Recht und Staat, 170/171. Tübigen: J. C. B. Mohr, 1952. 9″. Pp. 48. DM 1.90

[This pamphlet gives a brief theoretical analysis of the savings–investment process the conclusions of which are applied to the post-war West German economy. The author contends that while there is a sufficient volume of savings forthcoming, investors are reluctant to commit themselves on long-term projects on account of their experience of debt devaluations. He concludes with a number of proposals designed to encourage free enterprise.]

BLANKE (W.). Über Theorie und Methode der Berechnung von Kaufkraftparitäten. Bremen: Bremer Aus schuss für Wirtschaftsforschung, 1952. 11½″.

[A scholarly survey of Cassel's doctrine of purchasing power parity as expounded by recent English and German writers.]

BRAEUER (W.). Handbuch zur Geschichte der Volkswirtschaftslehre. Frankfurt am Main: Vittorio Klostermann, 1952. 9½″. Pp. 224. DM 18.50

[Reviewed in this issue.]

Die Chemische Industrie in der Sowjetischen Besatzungszone. Bonner Berichte aus Mittel-und Osterdeutschland. Bonn: Bundesministerium für Gesamtdeutsche Fragen, 1952. 8″. Pp. 80.

[This is one of a series of documents issued by the Western government on developments in Eastern Germany. It deals with the socialisation of the chemical industry. The study is well supported by statistics and gives details of the growth of the industry in the post-war period and the proposals under the five-year plan.]

EDDING (F.). Die Flüchtlinge als Belastung und Antrieb der westdeutschen Wirtschaft. Kiel: Instituts für Weltwirtschaft an der Universität Kiel, 1952. 8½″. Pp. 63.

[Since the end of the war Western Germany has faced a refugee problem which on account of the continuing influx from Eastern Europe shows only small signs of diminishing. This study of the "The Refugees as a Burden and Challenge to West German Economy" sets out the relevant facts in some detail. It emphasises the importance of a high level of investment in helping the integration of the refugees into the economic life of Western Germany, and suggests that a central authority for refugee problems would be advisable.]

JÖHR (W. A.). Die Konjunkturschwankungen. Tübingen: J. C. B. Mohr, 1952. 10″. Pp. 675.

[To be reviewed.]

KUCZYNSKI (JÜRGEN). Studien zur Geschichte des deutschen Imperialismus. I. Monopole und Unternehmerverbände. Berlin: Dietz Verlag, 1952. 8″. Pp. 5 + 398.

[This is the second edition of a work first published in 1948, and differs only in a number of amendments "due primarily to a more thorough study of the works of J. V. Stalin."]

KUCZYNSKI (JÜRGEN). Studien zur Geschichte der weltwirtzchaft. Berlin, 1952. 8″. Pp. 5 + 200.

[These are a number of essays on the growth of the "world economy." They are concerned with the broad trends of production and international trade in the last century and a half. The point of view adopted by the author often puts facts in an unusual light; there is, for example, a remarkable table on p. 50 showing how the industrial output of the imperialist sector of the world rose by a mere 36% from 1913 to 1938 while that of the socialist sector rose by 800%.]

SCHUMPETER (J. A.). Aufsätze zur Ökonomischen Theorie. Tübigen: J. C. B. Mohr, 1952. 9½″. Pp. 608. DM 38.50.

[Reviewed in this issue.]

KRAUS (O.). Sozialprodukt und Volkseinkommen. Berlin: Duncker & Humblot, 1952. 9½″. Pp. 123. DM 8.60.

[An exposition and critical discussion of the notions of social product and national income based on Keynesian teaching. There are in addition useful chapters on the finance of investment and income distribution.]

WEDDIGEN (W.). Wirtschaftsethik. System humanitärer Wirtschaftsmoral. Berlin: Duncker and Humblot, 1951. 9″. Pp. 214. DM 12.70.

[The author has attempted to examine the implications of different systems of ethics, particularly the Christian ethic, for economic organisation. His general thesis is that the Christian ethic is summed up in the postulate of "love thy neighbour." If this proposition is accepted and is applied to economic organisation, then one can with consistency avoid supporting planned economies which, in the author's opinion, inevitably lead to slavery. The development of the general thesis is not always clear, the reader being led astray by continual digressions on definition made necessary by the very wide coverage of the work in regard to the study of different economic organisations. The author does, however, indicate some of the more obvious conflicts between certain "welfare" criteria (such as maximisation of output per head) and his fundamental postulate.]

Swiss

BRIEFS (G.). Zwischen Kapitalismus und Syndikalismus. Bern: A. Francke, 1952. 9″. Pp. 189.

[In this book on the managerial revolution and the crisis in human affairs Professor Briefs of Georgetown (Catholic) University, Washington, argues that despite the danger of syndicalist totalitarianism it is the duty of trade unions to defend the liberty and the values of the worker.]

CHRISTEN (H.). Theoretische Betrachtungen sur schweizerischen Kriegswirtschaftspolitik. Bern: A. Francke, 1952. 9½″. Pp. iii + 146. Swiss Fr. 15.

[This monograph on some *Theoretical Observations on the Swiss War Economy* examines a number of reports and recommendations originating in government or university sources that were made about 1940 and were concerned with the problems that would be encountered on the mobilisation of the Swiss economy. The discussion centres on the best method of preventing inflation, and various views are presented on the relevance to this topic of the quantity theory of money.]

GRAF (W.). Der Aussenhandel zwischen marktwirtschaftlich organisierten und zentralgeleiteten Volkswirtschaften. Zurich and St. Gallen: Polygraphischer, 1951. 8½". Pp. xvi + 190. Swiss Fr. 12.

[After a rather long introduction which outlines in brief the main characteristics of planned economies and market economies, the author considers the international economic relations of both types of economy in theory and practice. The attempt to relate theory to practice is not altogether successful. It is a good idea to check what the literature on the theory of socialist economies has to say on international trade against the actual practices of planned economies. However, the theory the author uses is a trifle elementary and is primarily "micro-economic" in character, and he has some difficulty in finding out what actually goes on in the trade relations between Russia and her satellites. He is on safer and better known ground when he considers East–West trade relations. A final chapter considers the articles on non-discrimination and marketing in the World Trade Charter in relation to his main problem.]

HINTERKIRCHER (H.). Konsumfinanzierung in der Schweiz. Mitteilungen aus dem handelswissenschaftlichen Seminar der Universität Zürich No. 91. Zürich: Schulthess, 1951. 10". Pp. 224. Swiss Fr. 10.

[This volume is a descriptive study of consumer credit in Switzerland and more particularly of hire purchase. After an interesting chapter which traces the growth of instalment trading in Switzerland to the relative growth of wage and salary earners as part of the working population, the author proceeds to examine the origins of the different systems of consumer credit. A large part of the study is taken up with the details of alternative hire-purchase arrangements, and thus with the purely institutional aspects of the subject. While one might have welcomed some economic analysis of the consequences of this comparatively new development in Swiss financial history, the details of financial method are not without interest for the student of business finance. The work concludes with a very comprehensive bibliography of Continental literature on consumer credit.]

MEYER (WERNER). Elemente zu einer Beschaffungstheorie des Betriebes. Basel: Helbing & Lichtenhahn, 1951. 9½". Pp. v + 139. Swiss Fr. 12.50.

[This book is concerned with what in the American literature is known as "scientific purchasing" and "inventory control" that is, business problems which are simple to solve in theory but difficult in practice. Some of the economically more interesting problems such as obsolescence and the valuation of stocks in times of changing prices are hardly touched on.]

Austrian

TINBERGEN (J.). Einführung in die Ökonometrie. Vienna: Humboldt, 1952. 7½". Pp. 271.

[This is the German translation of the book reviewed in this issue on p. 118. It differs from the English edition in omitting three appendices.]

Dutch

TISSOT VAN PATOT (J. P. B.). Het Concentratie-Verschijnsel in het Binnenlandse Vervoerwezen. Maarssen, 1952. 9½". Pp. 7 + 182.

[This study of the concentration process in inland transport in Holland is concerned particularly with its effect on the location of industry.]

Italian

CARLUCCI (G.). Le Svalutazioni Monetarie Inglesi del 1931 e del 1949. Milan: Unione tipografica, 1952. 9½″. Pp. 26.

[The author compares and contrasts the circumstances preceding and necessitating the devaluations of sterling in 1931 and 1949 respectively.]

FRUMENTO (A.). Imprese Lombarde nella Storia della Siderurgia Italiana. Il Contributo di Falck. Vol. I, 1833–1913. Milan: Campi, 1952. 9½″. Pp. ix + 274.

[A history of the firm Acciaiere e Ferriere Lombarde Falck from its origins early in the nineteenth century up till the beginning of the First World War. The volume is richly illustrated with maps, photographs and drawings.]

INSTITUTO DI ECONOMIA INTERNAZIONALE. Introduzione Statistica allo Studio dei Problemi Economici dell'Europa Federata. Genoa: Instituto di Economia Internazionale, 1952. 10½″. Pp. 164.

[The idea underlying this unusual and original compilation of statistical information is to provide in comparable form a wide range of particulars relating to the economies of Belgium, Luxemburg, France, Italy, Western Germany and Holland (these countries being designated the "Federal Area"), with the corresponding figures for Britain and the United States added for purposes of comparison.]

VINCI (F.). La Teoria dell'Illusione Finanziaria di A. Puviani nel suo Cinquantesimo Anniversario. Milan: Unione tipografica, 1953. 9½″. Pp. 33.

[An interesting but neglected problem on the borderline of economics and psychology is that of determining the best way of collecting a given amount of taxes, taking into account the prejudices and "illusions" of the tax-payer. What, for example, are the advantages of the *Pay As You Earn* scheme of tax collection? In this pamphlet Professor Vinci directs attention to the work of Puviani on the theory of money illusion which deals with problems of this kind and was published fifty years ago.]

Israel

TADMOR (C.). Israel Economic Survey, January–June, 1952. Israel Business Pamphlets, No. 3. Jerusalem: Economic Department of the Jewish Agency for Palestine, 1952. 8½″. Pp. 78.

[This is the first of what is intended to be a series of regular quarterly surveys of economic conditions in Israel. The present issue contains a large amount of background information on the economy of Israel, in addition to a survey of the first half of 1952.]

Latin American

Banco Nacional de Cuba. Memoria, 1950–1951. Havana: Banco Nacional de Cuba, 1952. 9½″. Pp. 531.

[This contains a long essay on recent developments in the Cuban economy, together with a very extensive collection of statistical series, some of them carried back for many years.]

CAMPOS (W. E.). Administracion de Empresas. Buenos Aires: Editorial Bibliografica Argentina, 1952. 9″. Pp. 381.

[A treatise on the personal and social aspects of the technique of business administration.]

Korean

BLOOMFIELD (A. I.). Report and Recommendations on Banking in South Korea. Pusan: The Bank of Korea, 1952. 10″. Pp. 92.

[Mr. Bloomfield was one of the two authors of the Act establishing the Bank of Korea, which was passed by the National Assembly in April 1950. The present report was written early in 1952, and surveys the working of the banking system in the intervening years of war and inflation. The author recognises that banking policy can play only a small part in checking the rampant inflation, but he is strongly of the opinion that much more vigorous anti-inflationary measures can and should be adopted by the banks than has been the case hitherto.]

Official

BRITISH

The Index of Industrial Production. Studies in Official Statistics, No. 2. London: Her Majesty's Stationery Office, 1952. 8½″. Pp. 54. 2*s*. 6*d*.

[This study describing the new Index of Production follows the lines of the earlier study on the Interim Index. A description of the methods is followed by appendices giving the series, deflators and special indices used. The index has 1,300 series, but 700 are for munitions. There are interesting sections on the use of employment and annual series and on spreading indicators by estimated days worked. With these improvements and weights from the 1948 Census of Production this index is a considerable advance on its predecessors; but it still relies on the doubtful hypothesis that gross output can be taken as a measure for changes in net output. In the appendix listing the indicators each indicator's weight is now shown, also its unit and period of measurement, and the weights can be found as a proportion of the total and in 1948 values.]

AUSTRALIAN

BUREAU OF AGRICULTURAL ECONOMICS. The Papuan Rubber Industry. Canberra: Bureau of Agricultural Economics, 1952. 8½″. Pp. 33.

[A short study of production costs and possible outlets in the Australian market. Total cash costs are estimated at 1*s*. 2*d*. per lb. for all saleable rubber.]

CEYLON

CENTRAL BANK OF CEYLON. Annual Report of the Monetary Board to the Minister of Finance for the Year 1951. Colombo: Central Bank of Ceylon, 1952. 10″. Pp. 73, and appendices.

[This report contains a survey of the general economic situation in Ceylon in 1951 and an extensive collection of statistics relating to the country's economy, in addition to an account of the Central Bank's activities during the year.]

International

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT. The Economic Development of Iraq. Report of a mission organised by the Bank at the request of the government of Iraq. Baltimore: Johns Hopkins Press for IBRD (London: Geoffrey Cumberlege), 1952. 8½″. Pp. 463. 40*s*.

[To be reviewed.]

INTERNATIONAL LABOUR OFFICE. The International Labour Code, 1951 (2 volumes). Geneva: The International Labour Office, 1952. 10½″. Vol. I. Pp. v + 1181. Vol. II. Pp. v + 1220.

[To be reviewed.]

INTERNATIONAL MONETARY FUND. Balance of Payments Yearbook. Volume 4. 1950–1951. Prepared by Balance of Payments Division. Washington: International Monetary Fund, 1952. 11½″. Pp. 289.

[This fourth issue contains certain important innovations. The data for each country begin with a most convenient summary table covering the years 1946–51 (or as many as are available) with the compensatory official financing for each year set off against the surplus or deficit of the year, calculated under three heads: goods and services; private donations and capital movements; special official financing. The more detailed statements in terms of the standard classification are now confined to the current year and are relegated, with all their inevitable attendant footnotes, to the end of each country section. This is a very valuable improvement from the point of view of the ordinary user.]

INTERNATIONAL MONETARY FUND. The World Payments Situation. A Series of Charts with Commentary Presented to the Seventh Annual Meeting of the Board of Governors of the International Monetary Fund. Washington: International Monetary Fund, 1952. 11″. Pp. 54.

[This contains a series of very convenient and well-designed charts illustrative of movements not merely in international trade and payments but also in prices, incomes and other such magnitudes in different countries of the world, the period covered being for the most part 1950, 1951 and the first half of 1952. The charts, with the brief but illuminating commentaries by various authors that accompany them, were presented at the meeting of the Board of Governors of the IMF held in Mexico City in September 1952.]

INTERNATIONAL TIN STUDY GROUP. 1952 Statistical Year Book. The Hague: International Tin Study Group, 1952. 11″. Pp. 266. 40*s*.

[This is the second year book that the International Tin Study Group has prepared, the first having been published in 1949. The coverage has now been substantially extended particularly with regard to statistics of production of and trade in canned foods.]

UNITED NATIONS. Preliminary Report on the World Social Situation. New York: United Nations, 1952. 11″. Pp. 180. 12*s*. 6*d*.

[To be reviewed.]

WORLD POWER CONFERENCE. Statistical Year-book of the World Power Conference. No. 6. Annual Statistics for 1948–50. Edited by BROWN (F.). London: The Central Office of the World Power Conference, 1952. 11″. Pp. 163. 35*s*.

[This valuable work of reference contains all the essential statistical data for sources of fuel and power down to 1950, and, where they are available, provisional figures for 1951. Summary tables estimate total known supplies for coals, petroleum and electricity, but the inadequacy of the figures for the U.S.S.R. and Eastern Europe generally preclude the calculation of world totals.]

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M. KALECKI. Published in lieu of second editions of Dr. Kalecki's *Essays in the Theory of Economic Fluctuations and Studies in Economic Dynamics*, which have been unobtainable for some time, this volume consists of six parts: Degree of Monopoly and Distribution of Income; Determination of Profits and National Income; The Rate of Interest; Determination of Investment; the Business Cycle; and Long-Run Economic Development.

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